

Mamre Road upgrade between the M4 Motorway and Erskine Park Road

Addendum review of environmental
factors
April 2024



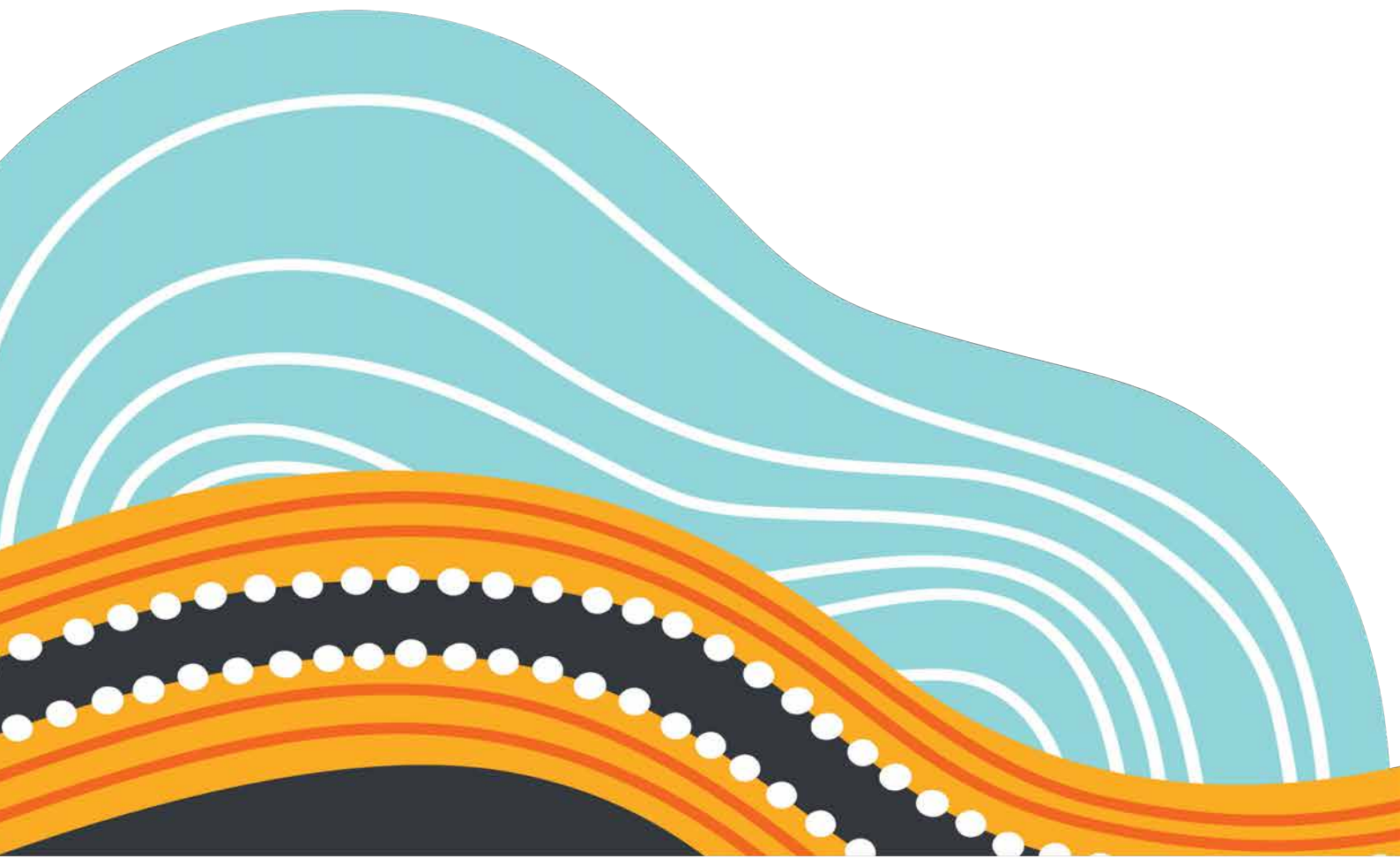
Acknowledgement of Country

Transport for NSW acknowledges the traditional custodians of the land on which we work and live.

We pay our respects to Elders past and present and celebrate the diversity of Aboriginal people and their ongoing cultures and connections to the lands and waters of NSW.

Many of the transport routes we use today – from rail lines, to roads, to water crossings – follow the traditional Songlines, trade routes and ceremonial paths in Country that our nation's First Peoples followed for tens of thousands of years.

Transport for NSW is committed to honouring Aboriginal peoples' cultural and spiritual connections to the land, waters and seas and their rich contribution to society.



Executive summary

This document is an addendum Review of Environmental Factors (Addendum REF) for a proposed modification to the approved 'Mamre Road upgrade between the M4 Motorway and Erskine Park Road' project (the approved project).

The purpose of this addendum REF is to describe the proposed modification, document the likely impacts of the proposed modification on the environment and detail any additional environmental safeguards and management measures required for the proposed modification.

The proposed modification

In 2021, Transport for NSW (Transport) proposed to upgrade about 3.8 kilometres of Mamre Road to a four-lane divided road to improve road safety and movement between the M4 Motorway and Erskine Park Road. A Review of Environmental Factors (REF) was prepared for the Mamre Road upgrade project in August 2021 (referred to as the project REF). The project REF was placed on public display between 25 August 2021 and 26 September 2021 for community and stakeholder comment. A submissions report dated July 2022 was prepared to respond to issues raised (referred to as the project submissions report). The project was determined in July 2022.

Transport now proposes to modify the approved project to facilitate adjustments to utilities, minor property work and other minor work to support the upgrade of Mamre Road (referred to as the proposed modification). Key features of the proposed modification include:

- basin filling work and refinements to drainage channels
- property work including the relocation of parking areas at Erskine Park Rural Fire Service, adjustment to the driveway at the KFC fast food restaurant, and relocation of an existing earth mound within private property
- removal of additional trees identified by an arborist to have likely root impacts from the road upgrade work (see Figure 1-2)
- extension of the shared path between Banks Drive and the M4 Motorway
- relocation of the heritage node near Mamre House
- provision of additional space to enable fence construction (see Figure 1-2)
- construction of a turning tee to connect to an existing access track located on the western side of Mamre Road (see Figure 1-2)
- relocation of existing signage near the northern extent of the approved proposal area to an existing post
- utilities that may require additional excavation outside of the approved proposal area.

It is anticipated that construction would start in late 2024.

Background

Mamre Road is a State arterial road that services north-south journeys for freight, general traffic and public transport in Western Sydney and provides connections to the Western Sydney Employment Area and the Western Sydney Aerotropolis. The NSW Government has identified the need to progressively upgrade arterial roads in Western Sydney to support predicted future economic and residential growth in the area. An upgrade of Mamre Road would provide an improved link between the M4 Motorway in the north and Elizabeth Drive in the south. Elizabeth Drive would connect to the future M12 Motorway, which is expected to open in 2026 and would provide the main road access to the Western Sydney Airport. Mamre Road is located within the City of Penrith local government area (LGA) in Sydney, New South Wales (NSW).

Need for the proposed modification

The proposed modification is needed to enable the widening of Mamre Road as described in the project REF, from a two-lane undivided road to a four-lane divided road. Since the submissions report was prepared, the design of the Mamre Road upgrade has been refined during detailed design. These design refinements were informed by additional investigations (such as an arborist investigation) and consultation with utility providers and property owners. As a result, the proposed

modification has been developed to include the necessary work that has been identified as required during detailed design (in addition to the approved project) to facilitate the successful widening and upgrade of Mamre Road. The proposed modification also captures minor design changes (such as the location of the heritage node and extension of the shared path) where they were identified to provide additional benefits compared to the approved project. The proposed modification would include changes to improve safety, amenity and connectivity for pedestrians, motorists and cyclists, and improve the constructability of the approved project.

Proposal objectives

The proposal objectives that apply to the proposed modification as outlined in the project REF are to:

- improve road safety in line with the *NSW Road Safety Strategy 2012-2021* Safe System Directions and Safer Roads Key Focus
- improve movement and travel times between the M4 Motorway and Erskine Park Road for general traffic, freight and bus services operating along the corridor
- support economic growth and productivity by providing increased road capacity for the projected traffic volumes on Mamre Road
- improve quality of service, sustainability and liveability by providing facilities for walking, cycling and future public transport needs and improving the urban design of the road corridor
- maintain a safe and efficient environment for all road users.

Options considered

The options for the proposed modification are:

- Option 1 – Proceed with the approved project as described in the project REF, without any additional scope of work
- Option 2 – Proposed modification to include design refinements identified as required during detailed design and associated modifications to the approved proposal area to support the widening of Mamre Road.

These options were assessed against development criteria which included:

- linking to existing infrastructure while also allowing for future road upgrades and access to planned development
- maximising the safety and suitability of Mamre Road
- minimising traffic and access impacts
- minimising adverse environmental impacts
- minimising private property acquisition and amenity impacts
- achieving value for money.

‘Option 2’ was identified as the preferred option due to its consistency with the objectives of the proposal and development criteria and benefits to road users and pedestrians from the extended shared path during operation, without substantially increasing environmental impacts. Option 1 would be undesirable as it would not include the required property adjustments such as adjusting the KFC fast food restaurant driveway to connect to the wider road corridor. It would also not allow for removal of trees beyond the approved proposal area where the root zones are impacted by approved work. It would also not allow for all the required utility connections to existing properties.

Statutory and planning framework

The proposed modification is for the purpose of a road and is to be carried out by Transport, which is a public authority. In accordance with Section 2.109 of the State Environmental Planning Policy (Transport and Infrastructure) 2021 (Transport and Infrastructure SEPP), the proposed modification can therefore be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Development consent from council is not required.

This addendum REF is to be read in conjunction with the project REF and project submissions report.

This addendum REF fulfils Transport's obligation under Section 5.5 of the EP&A Act including to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

An assessment of the proposed modification concluded that it would be likely to significantly impact Cumberland Plain Woodland, which is listed as a critically endangered ecological community (CEEC) under both the *Biodiversity Conservation Act 2016* (BC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). However, a referral is not required for proposed road activities that may affect nationally listed threatened species, endangered ecological communities and migratory species as the requirements for considering impacts to these biodiversity matters are the subject of a strategic assessment approval granted by the Australian Government in September 2015. A Biodiversity Development Assessment Report (BDAR) was prepared by Niche for the project REF (refer to Section 6.1 of the project REF and Appendix D to the project REF). Since then, due to the minor adjustments proposed to the vegetation clearance boundary (refer to Chapter 3), an addendum BDAR was prepared by Niche to assess any changes to the potential impacts and biodiversity offset obligation as a result of the proposed modification (provided in Appendix D and summarised in Section 6.1). This addendum REF has been prepared to meet the requirements of the EPBC Act strategic assessment approval for Transport Division 5.1 road activities.

The proposed modification is not likely to have a significant impact on other matters of national environmental significance or the environment of Commonwealth land within the meaning of the EPBC Act. A referral to the Australian Department of Climate Change, Energy, the Environment and Water is not required.

Therefore, the proposed modification is a valid development to be taken forward under Division 5.1 of the EP&A Act and no further planning approval requirements would be triggered under the EPBC Act or BC Act.

Community and stakeholder consultation

The consultation strategy relevant to the proposed modification remains consistent with Section 5.1 of the project REF, which includes implementation of a Community and Stakeholder Engagement Plan (CSEP) to guide consultation activities. Ongoing consultation, community updates and notification in advance of road closures or night work for the proposed modification would be consistent with the project REF.

The requirements for consultation in accordance with the Transport and Infrastructure SEPP were met in the project REF.

Public display of this addendum REF to gather comments for submissions reporting was not considered necessary given that the amendments the proposed modification would make to the approved project would be minor in scale, and extensive consultation regarding the approved project that has been undertaken to date.

This addendum REF will be made available on the Transport website, so that the community and stakeholders are informed about what is being proposed.

Environmental impacts

The main environmental impacts for the proposed modification are:

Biodiversity

The proposed modification would have an additional impact on 0.35 hectares of native vegetation and associated habitat. The proposed modification would increase the vegetation clearing to two Plant Community Types (PCTs):

- PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
- PCT 835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion.

The PCTs are also listed as the following Threatened Ecological Communities (TECs) under the *Biodiversity Conservation Act 2016* (BC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act):

- PCT 849 aligns to Cumberland Plain Woodland, which is listed as a Critically Endangered Ecological Community (CEEC) under the BC Act and the EPBC Act
- PCT 835 aligns to the River-flat Eucalypt Forest, which is listed as a CEEC under the BC Act and an Endangered Ecological Community (EEC) under the EPBC Act.

The proposed modification would result in an additional 0.35 hectares of impact to habitat for two threatened biodiversity species that are regarded as 'species credits' as per the requirements of the BAM (Biodiversity Assessment Method): Cumberland Plain Land Snail and Southern Myotis.

Through the application of the BAM, associated guidelines and the BAM-C, the following additional biodiversity credit offsets are required for the proposed modification:

- 7 credits for PCT 835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
- 2 credits for PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
- 9 credits for Southern Myotis
- 9 credits for Cumberland Plain Land Snail.

Aboriginal heritage

An Aboriginal Heritage Impact Permit (AHIP) application was submitted for the proposed impacts to the eight Aboriginal archaeological sites within the approved project area in May 2022. An AHIP was issued for Mamre Road Upgrade Stage 1 in December 2022 (AHIP 5018). The work proposed as part of the proposed modification within the approved AHIP boundary would be consistent with the completed AHIP mitigation and no new mitigation is required for this area.

The proposed modification boundary includes two additional Aboriginal archaeological sites (MWP-AD8 and MWP-IF1) that are outside the approved proposal area and were not approved for impact in AHIP 5018. However, these two sites have a confirmed status of 'destroyed' within AHIMS (19/12/23). As both sites MWP-AD8 and MWP-IF1 are destroyed and not valid, no additional assessment or AHIP application is required for the proposed modification.

Non-Aboriginal heritage

The proposed modification would have minor impacts on non-Aboriginal heritage. The relocation of the heritage node proposed at Mamre House within the approved proposal area further from the road corridor would improve heritage interpretation outcomes as it would be in a quieter area less disturbed by operation of the road. This designated heritage node would explore the Aboriginal and non-Aboriginal cultural heritage values and key stories of the place through provision of interpretative elements.

However, during operation, the current urban design plan may obstruct the visual connection between Mamre House and the road, contrary to the terms of Section 60 Condition #3 – Landscaping.

The proposed modification would not change the area of minor impacts to the Marsden Memorial Cairn and the Luddenham Road Alignment. Blaxland Memorial Cairn and Leeholme Horse Stud Rotunda would remain unaffected by the proposed modification.

Traffic and transport

During construction, there may be potential minor short term negative impacts to active transport users that use the existing path on Mamre Road between Banks Drive and the M4 Motorway, as the proposed modification would involve extending the shared path and require additional traffic control measures during construction. Access for pedestrians and properties would be maintained for the duration of construction, where possible. However, short detours and alternative temporary paths around construction areas may be required to maintain safe access. An alternate route would be proposed for cyclists until the new shared path is constructed.

The proposed modification would also involve traffic control for a short-duration associated with utilities adjustment work. These adjustments would be minor and involve cable pulling work to existing communications nodes. Some of these are located beyond the proposed modification boundary, however, would be consistent with existing maintenance activities in the area.

There would be temporary access impacts to the KFC fast food restaurant as well as Erskine Park Rural Fire Service due to the proposed modification associated with construction of a new driveway and/or parking area. Safeguard TT10 has been amended to reflect the need for pre-construction consultation with Erskine Park Rural Fire Service and the KFC fast food restaurant.

During operation, extending the shared path north of Banks Drive would provide long term positive impacts for pedestrians along the length of Mamre Road to the M4 Motorway due to improved pedestrian and cyclist connectivity. The proposed modification also provides improved access to:

- Erskine Park Rural Fire Service through the provision of relocated parking alongside the relocated driveway
- the KFC fast food restaurant through driveway adjustments
- utilities along Mamre Road through construction of a turning tee that would connect to an existing maintenance access track.

Hydrology and flooding

The proposed modification may result in minor changes in the extent of flood level increases from the existing during a 1% Annual Exceedance Probability (AEP) flood event as a result of partially filling the existing basin. This minor increase in flood extent would be localised within 6 metres of the existing inlet stream of this existing basin. More frequent floods such as the 10% and 2% AEP events experience similar extents as the 1% AEP flood impacts. The area where flood impacts occur are situated within dense vegetation where no dwellings, buildings or major infrastructure exist. As increases in flood levels and extents are minor and occur in densely vegetated land, flood impacts are considered inconsequential.

Flood modelling has confirmed that the full length of the proposed modification remains immune to the 1% AEP flood in both Local Flood and Mainstream Flood events, which is as per the approved project.

Soil and water quality

The proposed modification may result in water quality impacts that would be generally consistent with the approved project during construction. The highest risk of water quality impacts is from construction activities near the Luddenham Road intersection, where the proposed modification is closest to South Creek (about 100 metres away). This would include ground disturbance for a water main, and construction of the parking lots at Erskine Park Rural Fire Service. This work has potential to create sediment runoff that may affect aquatic habitat and ecosystems within South Creek, which is classified as Key Fish Habitat. However, any additional impacts on water quality would be negligible as the approved project already involves excavation and ground disturbance that is more substantial in scale and closer to South Creek.

The remainder of the proposed modification would result in similar impacts to South Creek as the approved project, with no additional direct disturbance to South Creek proposed during construction of the proposed modification.

During operation, as per the approved project, water quality basins, swales and scour protection would minimise any adverse impacts on water quality.

Noise and vibration

Construction of the proposed modification would cause a negligible short-term increase in noise and vibration compared to the approved project. Utilities adjustments closer to residential properties, and extension of the shared path may increase noise impacts on nearby sensitive receivers, although this would be negligible increase in impact due to the existing traffic noise and minor scale of the work. Mitigation measures have been proposed in the approved project to consult with sensitive receivers that may experience noise or vibration impacts from construction of the proposed modification. No additional measures are proposed.

The proposed modification is not expected to change the operational noise impacts expected from the approved project.

Other notable impacts

It is also noted that the proposed modification:

- would result in a minor increase in landscape character and visual impacts, as the extension of the shared path on Mamre Road between Banks Drive and the M4 Motorway would increase the area in which construction work and transport infrastructure would be visible.
- may improve access and connectivity for pedestrians and cyclists during operation due to extension of the shared path.

Justification and conclusion

The proposed modification would facilitate adjustments to utilities, minor property work and other minor work to support the upgrade of Mamre Road.

The proposed modification would meet the proposal objectives by supporting the construction of the Mamre Road upgrade and would provide the required property adjustments and utility connections surrounding the road corridor. The proposed modification involves minor design refinements that would improve safety, amenity and constructability of the Mamre Road upgrade.

Several potential environmental impacts have been avoided or reduced during the detailed design development of the proposed modification. The design of the proposed modification has been refined to minimise removal of native vegetation where possible. The proposed modification would result in an adjustment of the vegetation clearance boundary, and minor additional removal of native vegetation and trees when compared to the approved project.

However, the proposed modification would still result in some short-term impacts on traffic, noise and vibration, and water quality during construction as well as some longer-term minor biodiversity impacts. Environmental safeguards and management measures as detailed in this addendum REF would minimise these expected impacts.

Overall, the proposed modification is justified on the basis that it best meets the proposal objectives, supports the construction of the Mamre Road upgrade and facilitates the design developments and associated boundary modifications that were identified to be required since the project was approved.

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1. Introduction

1.1 Proposed modification overview

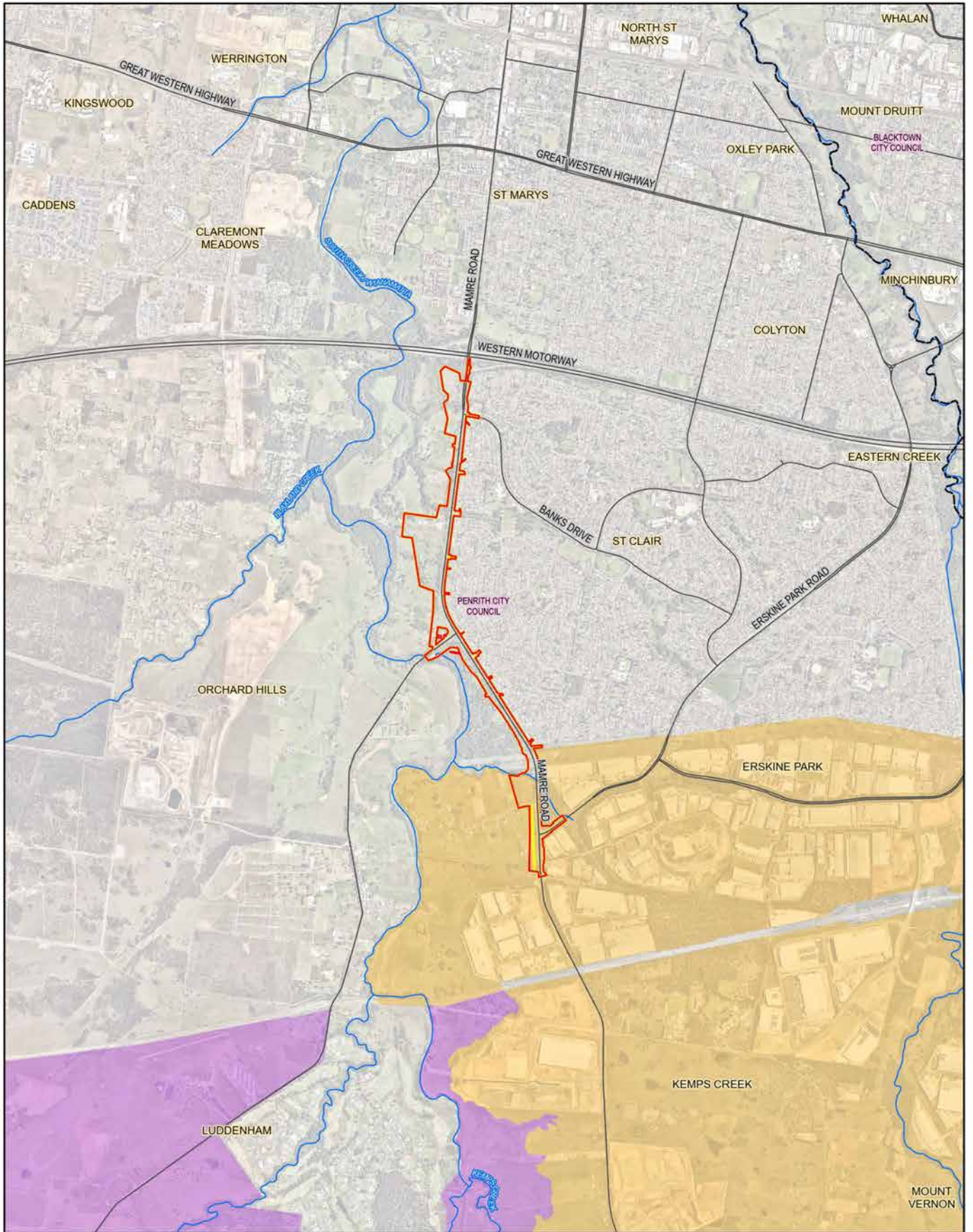
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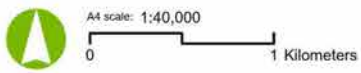
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- provision of additional space to enable fence construction (see Figure 1-2)
- construction of a turning tee to connect to an existing access track located on the western side of Mamre Road (see Figure 1-2)
- relocation of existing signage near the northern extent of the approved proposal area to an existing post
- utilities that may require additional excavation outside of the approved proposal area.

The location of the proposed modification is shown in Figure 1-1 and the proposed modification is shown in Figure 1-2. Chapter 3 describes the proposed modification in more detail.



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- Approved proposal area
- Proposed modification boundary
- Watercourse
- Local government area
- Western Sydney Aerotropolis
- Western Sydney Employment Area

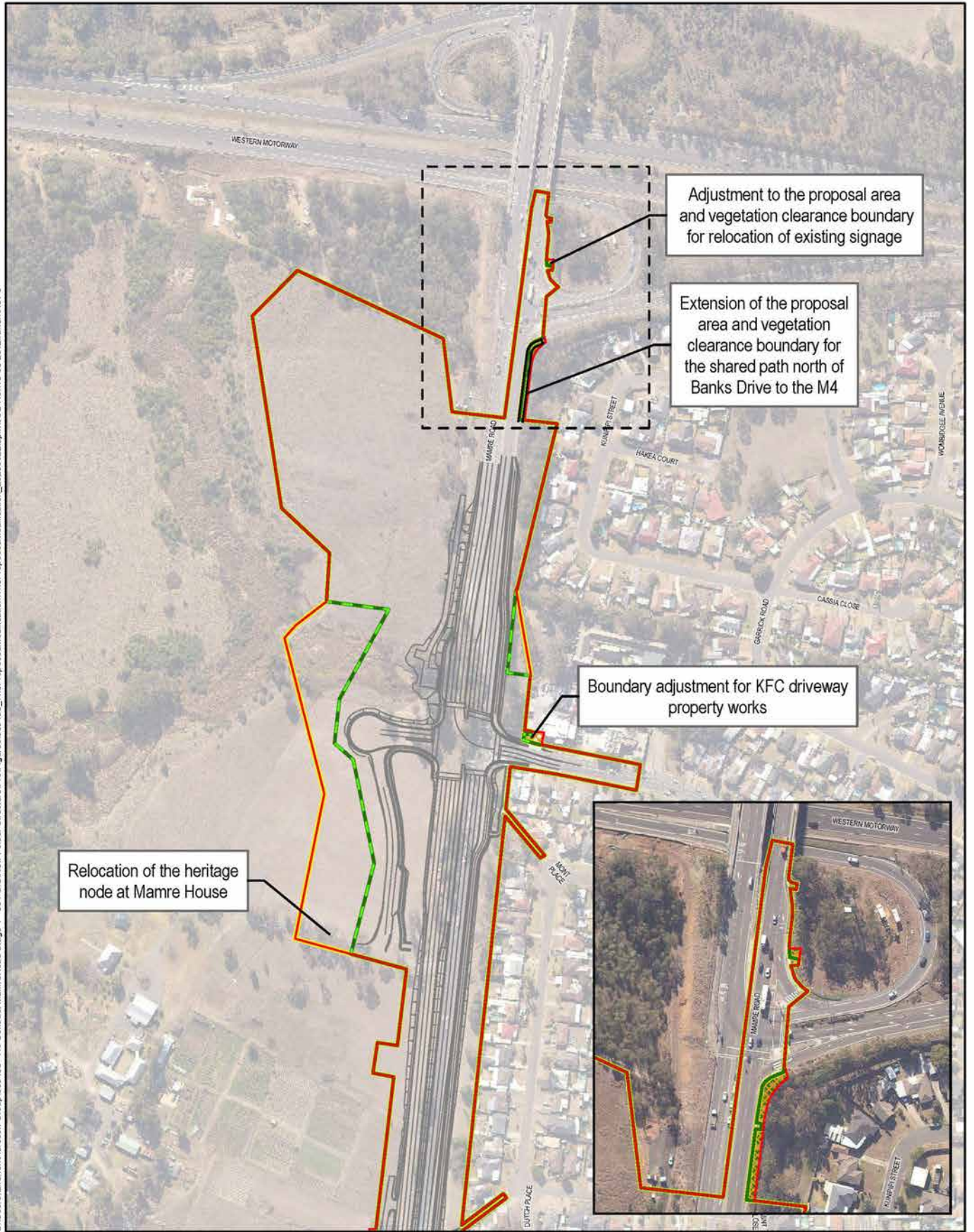


Date: 23/06/2023
 Coordinate System: GDA2020 MGA Zone 56

Mamre Road upgrade between the M4 Motorway and Erskine Park Road

Figure 1-1: Location of the proposed modification

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- The proposed modification
- Detailed design
- Approved proposal area
- Proposed modification boundary
- Approved vegetation clearance boundary

- Proposed modified vegetation clearance boundary
- Difference between original and revised REF proposal area
- Difference between original and revised vegetation clearance areas

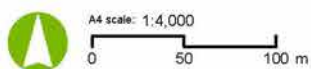
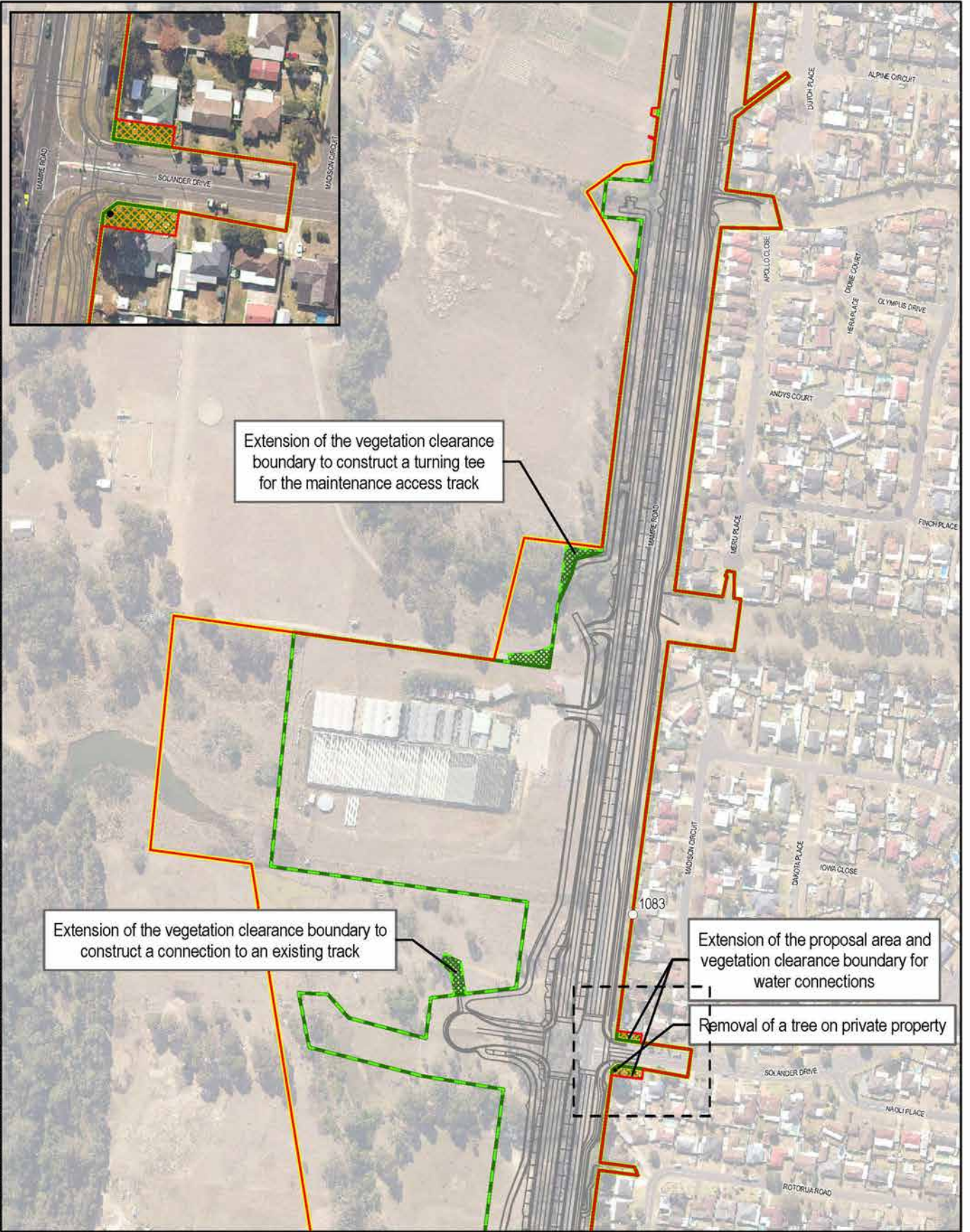
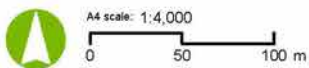


Figure 1-2: The proposed modification

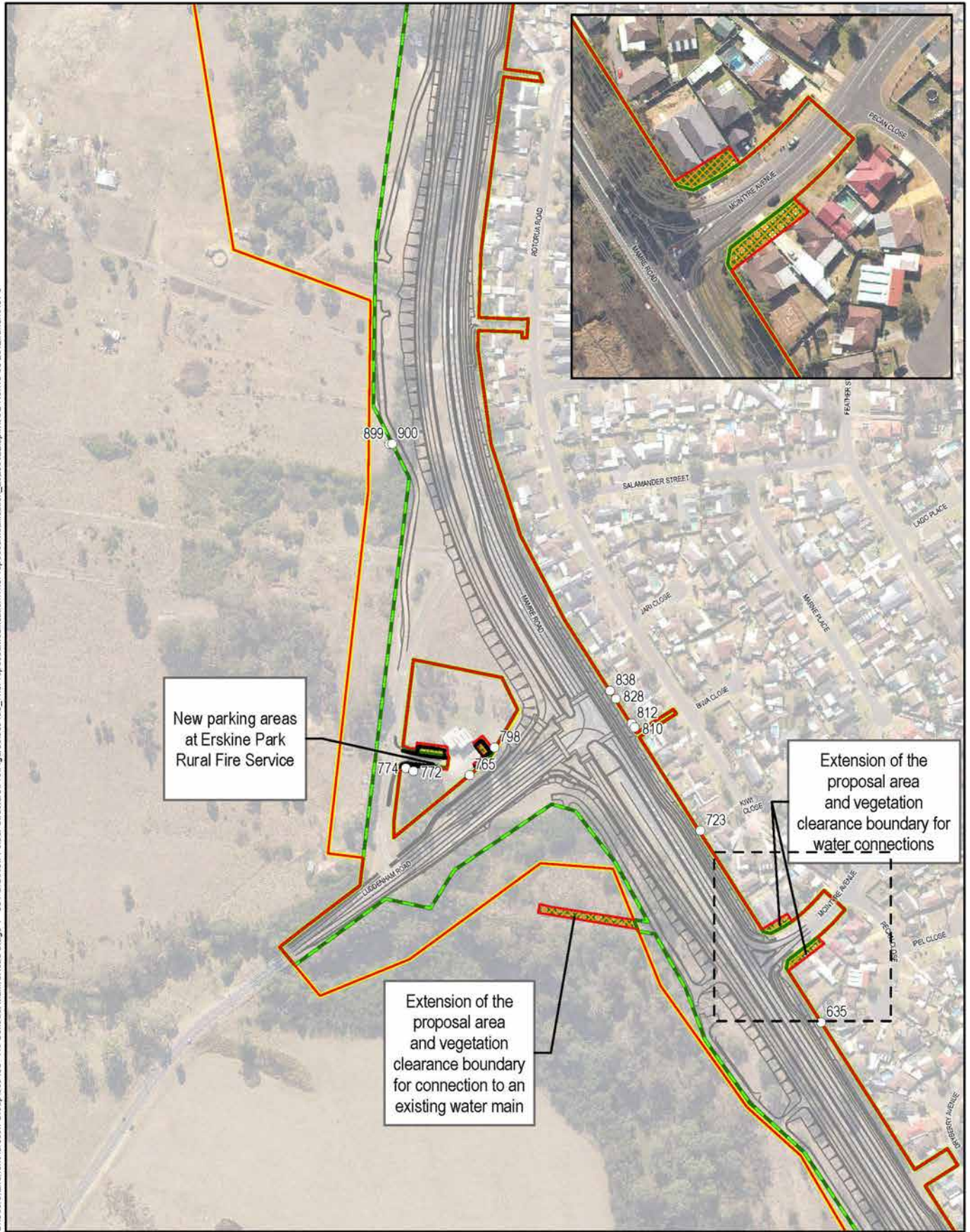


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- Additional trees requiring removal



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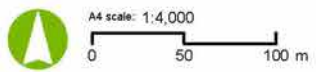
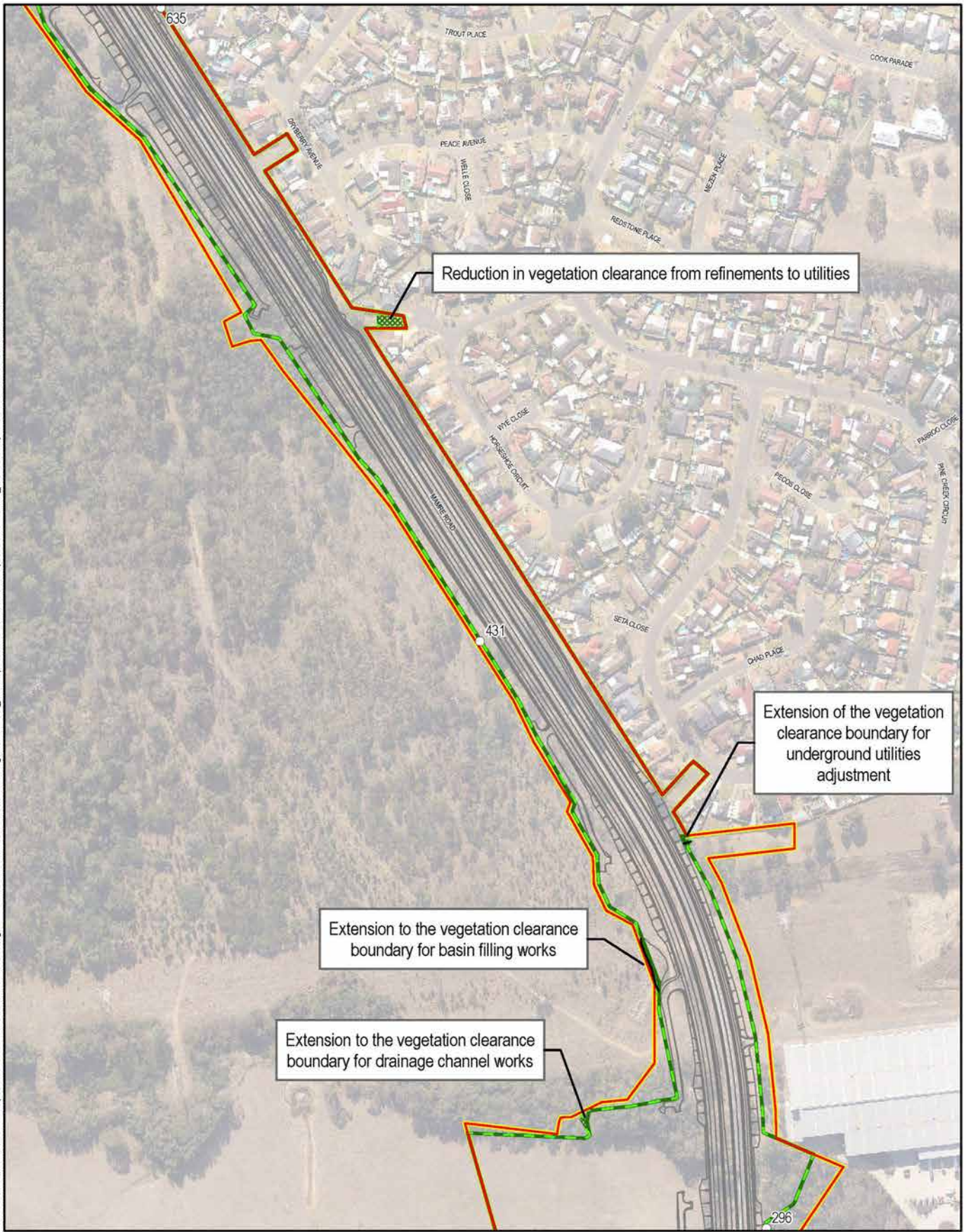


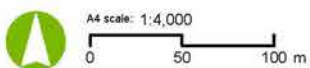
Figure 1-2: The proposed modification

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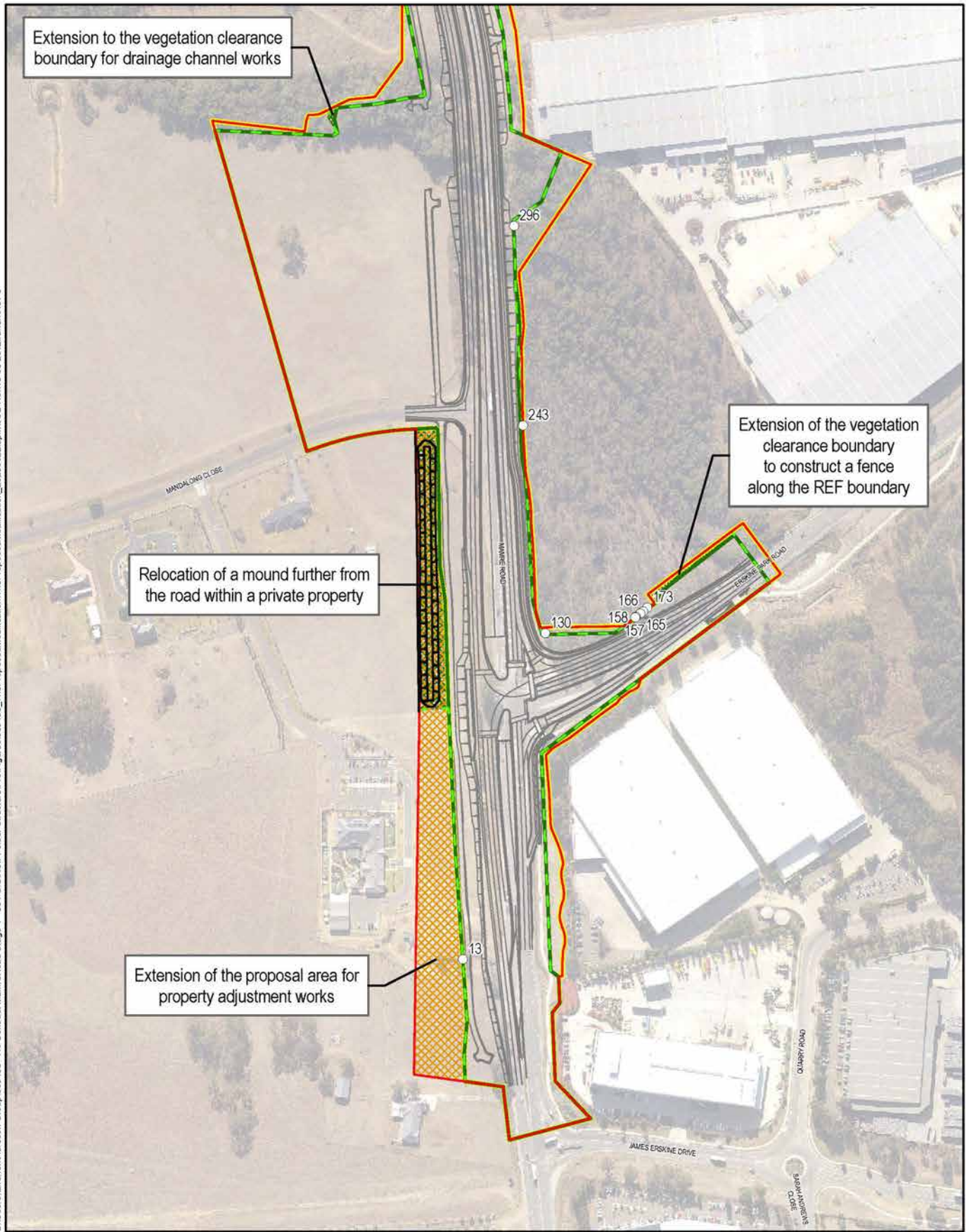


Date: 23/08/2023
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Mamre Road upgrade between the M4 Motorway and Erskine Park Road

Figure 1-2: The proposed modification

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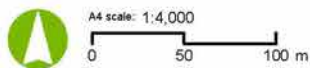


Figure 1-2: The proposed modification

1.2 Purpose of the report

This addendum review of environmental factors (REF) has been prepared by Aurecon Australasia Pty Ltd (Aurecon) on behalf of Transport for NSW (Western Parkland City – Sydney Infrastructure Development – Infrastructure and Place directorate) (Transport). For the purposes of these works, Transport is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This addendum REF is to be read in conjunction with the project REF and submissions report for the project. The purpose of this addendum REF is to describe the proposed modification, to document and assess the likely impacts of the proposed modification on the environment, and to detail mitigation and management measures to be implemented.

The description of the proposed work and assessment of associated environmental impacts has been undertaken in context of Section 171 of the Environmental Planning and Assessment Regulation 2021, *Is an EIS Required? Best Practice Guidelines for Part 5 of the Environmental Planning and Assessment Act 1979* (Is an EIS Required? guidelines) (DUAP, 1995/1996), *Roads and Road Related Facilities EIS Guideline* (DUAP, 1996), the *Biodiversity Conservation Act 2016* (BC Act), the *Fisheries Management Act 1994* (FM Act), and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In doing so, the addendum REF helps to fulfil the requirements of:

- Section 5.5 of the EP&A Act including that Transport for NSW examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity
- Strategic assessment approval granted by the Federal Government under the EPBC Act in September 2015, with respect to the impacts of Transport's road activities on nationally listed threatened species, ecological communities and migratory species.

The findings of the addendum REF would be considered when assessing:

- whether the proposed modification is likely to result in a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning under Division 5.2 of the EP&A Act
- the significance of any impact on threatened species as defined by the BC Act and/or FM Act, in Section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report
- the significance of any impact on nationally listed biodiversity matters under the EPBC Act, including whether there is a real possibility that the activity may threaten long-term survival of these matters, and whether offsets are required and able to be secured
- the potential for the proposed modification to significantly impact any other matters of national environmental significance or Commonwealth land and therefore the need to make a referral to the Australian Department of Climate Change, Energy, the Environment and Water for a decision by the Australian Government Minister for the Environment and Water on whether assessment and approval is required under the EPBC Act.

2. Need and options considered

2.1 Strategic need for the proposed modification

Chapter 2 of the project REF addresses the strategic need for the project, the project objectives and the options that were considered. The proposed modification described and assessed in this addendum REF is consistent with the strategic need for the project.

The proposed modification is needed to enable the widening of the road as described in the project REF, from a two-lane undivided road to a four-lane divided road. The proposed modification includes minor changes to the approved proposal area to allow for additional minor design developments and refinements that have been identified as required during detailed design to support the successful widening and upgrade of Mamre Road or to provide additional benefits.

Table 2-1 provides a more specific overview of the need for each aspect of the proposed modification that was identified as required.

Table 2-1 Need for proposed modification aspects

Proposed modification aspect	Need for design change
Relocation of a mound further west within the same private property	As requested by the property owner as well as to improve constructability of the adjacent widened road and minimise traffic impacts
Basin filling work on the western side of Mamre Road south of Pine Creek Circuit	To allow for utilities relocation and enable fencing along the property boundary
Relocated parking area within the Erskine Park Rural Fire Service property	To maintain safe and efficient parking from Luddenham Road as the existing parking would be unable to be accessed from the relocated access
Alterations to the driveway to the KFC fast food restaurant	To maintain safe and efficient access for delivery vehicles entering and exiting the KFC fast food restaurant
Construction of a turning tee located on a maintenance access track on the western side of Mamre Road	To improve maintenance access to utilities
Removal of additional trees with roots that are likely to be impacted by adjacent work	To improve safety and minimise risk of tree instability adjacent to the road
Extension of the northern shared path where Mamre Road intersects the M4 Motorway	To create consistency along Mamre Road to the north, improving safety and travel for pedestrians and cyclists
Extension of the vegetation clearance boundary to the north of Erskine Park Road	To construct a property boundary fence, improving safety during construction
Relocation of existing signage near the ramp at the M4 Motorway	To enable better signage placement for motorists
Additional utilities work beyond the approved proposal area	To facilitate relocation and installation of telecommunications, electrical, and a water main associated with the upgrade of Mamre Road

The proposed modification remains consistent with the policies and planning documents outlined in Chapter 2 of the project REF and listed below:

- *Future Transport Strategy 2056* (Transport for NSW, 2018)
- *Road Safety Plan 2021 – Towards Zero* (Transport for NSW, 2018)
- *Greater Sydney Services and Infrastructure Plan* (Transport for NSW, 2018)

- *NSW Freight and Ports Plan 2018-2023* (Transport for NSW, 2018)
- *Greater Sydney Region Plan: A Metropolis of Three Cities* (Greater Sydney Commission, 2018)
- *NSW State Infrastructure Strategy 2022-2042* (Infrastructure NSW, 2022)
- *Smart Cities Plan* (Australian Government, 2016)
- *Western City District Plan* (Greater Sydney Commission, 2018).

The proposed modification would also align with the *2026 Road Safety Action Plan* (Transport for NSW, 2022).

2.2 Proposal objectives and development criteria

Section 2.3 of the project REF identifies proposal objectives and development criteria that also apply to the proposed modification, which are to:

- improve road safety in line with the NSW Road Safety Strategy 2012-2021 Safe System Directions and Safer Roads Key Focus
- improve movement and travel times between the M4 Motorway and Erskine Park Road for general traffic, freight and bus services operating along the corridor
- support economic growth and productivity by providing increased road capacity for the projected traffic volumes on Mamre Road
- improve quality of service, sustainability and liveability by providing facilities for walking, cycling and future public transport needs and improving the urban design of the road corridor
- maintain a safe and efficient environment for all road users.

The development criteria identified in the project REF also apply to the proposed modification and are to:

- design all connections and upgrades to link to existing infrastructure while also allowing for future road upgrades and planned development in the surrounding area
- maximise the safety and suitability of Mamre Road for vehicles, pedestrians, cyclists and public transport users, including through urban design and landscaping
- optimise the design to improve constructability so it can be built with minimal traffic and access impacts for road users, utility providers and surrounding residences and businesses
- minimise adverse impacts on the environment during construction and operation of the proposal, including on native vegetation and species, water quality and heritage
- minimise private property acquisition and amenity impacts on surrounding properties, including potential noise and visual impacts
- achieve value for money.

The urban design objectives outlined in the project REF also remain applicable (refer to Section 2.3.3 of the project REF).

2.3 Alternatives and options considered

This section summarises the design options that were considered for the proposed modification and explains why the preferred option was chosen.

2.3.1 Methodology for selection of preferred option

The preferred option would be chosen based on alignment with the development criteria described in Section 2.2. This approach is consistent with the methodology used for selection of options within the project REF.

2.3.2 Identified options

The options for the proposed modification are:

- Option 1 – Proceed with the approved project as described in the project REF, without any additional scope of work.
- Option 2 – Proposed modification to include design refinements identified as required during detailed design and associated modifications to the approved proposal area to support the widening of Mamre Road.

2.3.3 Analysis of options

Table 2-2 presents an analysis of the options against the development criteria for the project (refer to Section 2.2).

Table 2-2 Evaluation of options

Criteria	'Option 1' (approved project)	'Option 2' (the proposed modification)
Link to existing infrastructure while also allowing for future road upgrades and access to planned development	This option provides an opportunity to improve access to future recreational parkland planned along the western side of Mamre Road within land owned by Office of Strategic Lands.	This option would provide additional benefits to the approved project by improving connectivity for pedestrians along the length of Mamre Road to the M4 by extending the shared path north of Banks Drive. This option also maintains access to Erskine Park Rural Fire Service and relocates existing parking areas.
Maximise the safety and suitability of Mamre Road	Providing additional lanes and intersection upgrades could improve road safety and the road user experience along Mamre Road.	The safety benefits of the approved project also apply to the proposed modification, along with additional safety and user experience benefits for pedestrians and cyclists from the extension of the wider shared user path. Removal of trees impacted by the approved project would improve safety as impacts on tree roots from construction could cause them to fall.
Minimise traffic and access impacts	This option could be staged to minimise disruptions to traffic flow and access along Mamre Road.	Staging would be generally consistent with the approved project. The proposed modification would enable the removal of obstacles to widening the road corridor such as relocation of the earth mound which may improve constructability by minimising traffic impacts. Likewise, removal of the trees that have roots overlapping the location of required utilities would minimise challenges for utility providers, where the tree would impact utility work. Providing a relocated parking area for Erskine Park Rural Fire Service would maintain access to the Fire Brigade during operation of the proposed modification. The driveway of the KFC fast food restaurant would be altered as part of property adjustment work to accommodate delivery vehicles entering and exiting the restaurant, further maintaining safe and efficient access for these vehicles during operation of the proposed modification.
Minimise adverse environmental impacts	This option would result in environmental impacts on areas of native vegetation that have been identified for conservation as well as non-Aboriginal and Aboriginal heritage items. The widened 50 metre road corridor would impact about eight hectares of threatened ecological communities (TECs) (there may be further impacts due to supporting infrastructure required beyond this widened road corridor such as water quality basins/swales).	The proposed modification would have negligible additional environmental impacts to the approved project due to the minor nature of the proposed changes.

Criteria	'Option 1' (approved project)	'Option 2' (the proposed modification)
Minimise private property acquisition and amenity impacts	This option could take advantage of the existing 50-metre-wide road corridor reserved between the M4 Motorway and Luddenham Road. The widened road corridor would require about 9.7 hectares of additional land to be acquired (beyond the existing road corridor). The land to the west of Mamre Road includes a large amount of land owned by the Office of Strategic Lands, which would minimise the need for private property acquisition. Widening along the western side is also away from existing residential receivers to the east so would minimise amenity impacts.	Option 2 would have greater benefits to amenity compared to the approved project as the extension of the shared path would improve the experience of pedestrians and cyclists along Mamre Road. No additional private properties would be required to be acquired for the proposed modification compared to the approved project.
Achieve value for money	This option would minimise private property acquisition costs and maximise use of existing road infrastructure, so is considered able to achieve value for money. The potential road improvements would be similar to the option with widening along the eastern side.	The proposed modification has been developed to minimise additional land requirements beyond that identified in the project REF and submissions report. This option would provide greater long-term benefits through improved connectivity for pedestrians and ease of access for Erskine Park Rural Fire Service.

2.4 Preferred option

'Option 2' was identified as the preferred option due to its consistency with the objectives of the proposal and development criteria and benefits to road users and pedestrians from the extended shared path during operation, without needing to acquire additional properties or substantially increase environmental impacts. Option 1 would be undesirable as it would not include the required property adjustments such as adjusting the KFC fast food restaurant driveway to connect to the wider road corridor. It would also not allow for removal of trees beyond the approved proposal area where the root zones are impacted by approved work. It would also not allow for all the required utility connections to existing properties.

3. Description of the proposed modification

3.1 The proposed modification

Transport proposes to modify the approved project to facilitate adjustments to utilities, minor property work and other minor work to support the upgrade of Mamre Road (referred to as the proposed modification). The proposed modification is shown in Figure 1-2.

Key features of the proposed modification include:

- basin filling work and refinements to drainage channels
- property work including the relocation of parking areas at Erskine Park Rural Fire Service, adjustment to the driveway at the KFC fast food restaurant, and relocation of an existing earth mound within private property
- removal of additional trees identified by an arborist to have likely root impacts from the road upgrade work
- extension of the shared path between Banks Drive and the M4 Motorway
- relocation of the heritage node near Mamre House
- provision of additional space to enable fence construction
- construction of a turning tee to connect to an existing access track
- relocation of existing signage near the northern extent of the approved proposal area to an existing post
- utilities that may require additional excavation outside of the approved proposal area.

It is anticipated that construction would start in early 2024.

3.2 Design

3.2.1 Design criteria

The proposed modification has been designed to NSW and Australian engineering, road safety, environmental and transport planning standards developed by Transport, Austroads and Standards Australia. These standards describe the criteria that should be adopted for specific road classifications and conditions. The criteria have been developed to ensure all roads are designed to be safe, effective, well-planned and easily maintained. Relevant engineering standards are listed in Table 3-1.

Table 3-1 Key engineering standards and guidelines applicable to the proposed modification

Reference	Title
AS/NZS 1170	Structural Design Actions – General Principles
AS/NZS 1170.2	Structural Design Actions – Wind Loads
AS 1170.4	Structural Design Actions – Earthquake Actions in Australia
AS 1597.2	Precast Reinforced Concrete Box Culverts
AS 2159	Piling Design and Installation
AS 3600	Concrete Structures
AS 4100	Steel Structures
AS 5100	Bridge Design
Transport R271	Design and Construction of Noise Walls
Transport NR271	Guide to Design of Noise Walls
Austroroads technical guidelines	<ul style="list-style-type: none"> • Guide to asset management • Guide to bridge technology • Guide to pavement technology • Guide to project delivery • Guide to project evaluation • Guide to road design • Guide to road safety • Guide to transport planning • Guide to traffic management • Guide to road tunnels.

The key design criteria for the proposed modification are summarised in Table 3-2. Refinements in the key design criteria from the project REF are shown in **bold**.

Table 3-2 Summary of design criteria for the proposed modification

Aspect	Design Criteria
Speed limit	<p>Mamre Road (main carriageway) and Luddenham Road:</p> <ul style="list-style-type: none"> • 80 kilometres per hour posted speed • 90 kilometres per hour design speed <p>Mamre Road (northern end):</p> <ul style="list-style-type: none"> • 60 kilometres per hour posted speed • 70 kilometres per hour design speed <p>Erskine Park Road:</p> <ul style="list-style-type: none"> • 70 kilometres per hour posted speed • 80 kilometres per hour design speed <p>Banks Drive, Solander Drive, Mandalong Close and McIntyre Avenue:</p> <ul style="list-style-type: none"> • 50 kilometres per hour posted speed • 60 kilometres per hour design speed

Aspect	Design Criteria
<p>Cross section (refer to project REF Figure 3-2 and Figure 3-3)</p>	<p>Mamre Road (main carriageway) – minimum design criteria:</p> <ul style="list-style-type: none"> • two northbound and two southbound through lanes, with three lanes northbound and southbound on Mamre Road through the Banks Drive intersection • general lane width: 4.0 metres kerb side, 3.5 metres otherwise • median width at least 10 metres • left turn lane width: 4.0 metres • right turn lane width: 3.3 metres <p>Side roads – minimum design criteria:</p> <ul style="list-style-type: none"> • general lane width and left turn lane width: 3.5 metres (match to existing) • median width: 1.5 metres (where applicable) • right turn lane width: 3.3 metres <p>Minimum shared path width: 3.0 metres Minimum bus bay width: 4.0 metres and bus shelter width: 3.2 metres</p>
<p>Design vehicles</p>	<ul style="list-style-type: none"> • Mamre Road and Erskine Park Road: PBS Level 2B vehicles up to 26 metres in length • Mandalong Close, McIntyre Avenue, Solander Drive and Banks Drive: 12.5 metre long single unit truck • Solander Drive and Banks Drive western leg U-turn facility: 19 metre long semi-trailer • Luddenham Road: 19 metre long semi-trailer
<p>Grade</p>	<p>Maximum grades of:</p> <ul style="list-style-type: none"> • 4 per cent along Mamre Road (design speeds 70 to 90 kilometres per hour) • 3 per cent for side roads (design speeds of 60 to 90 kilometres per hour)
<p>Batter slope</p>	<p>Maximum 2H:1V cut and fill batters</p>
<p>Road surface</p>	<ul style="list-style-type: none"> • The northbound carriageway would require the construction of new pavement and would consist of thick asphalt over lean mix concrete subbase • The southbound carriageway is partially located on the existing pavement. Where this occurs, the existing pavement would either be milled and re-sheeted or fully reconstructed as full depth pavement. • Where new sections of the carriageway are constructed, full depth pavement would be required and would consist of thick asphalt over lean mix concrete subbase • The road surface and pavement design would be confirmed during detailed design.
<p>Flood immunity</p>	<p>1 in 100-year flood immunity on Mamre Road</p>

3.2.2 Engineering constraints

The engineering constraints would be consistent with the project REF. Table 3-3 lists the main engineering constraints and how they have been addressed in the proposed modification design.

Table 3-3 Engineering constraints for the proposed modification

Constraint	How it has been addressed in the proposal design	How it has been addressed in the proposed modification
Limited space for widening due to existing adjoining roads and surrounding properties	The proposal follows the existing Mamre Road alignment and maximises the use of the existing road corridor.	The proposed modification follows the existing Mamre Road alignment and maximises the use of the existing road corridor.
Existing and future land use changes and development west of Mamre Road that would require road access	A new fourth intersection leg with a U-Turn facility has been provided at the Banks Drive and Solander Drive intersections to allow vehicles to turn around, if required. In the future, this western leg would provide access for future parkland west of Mamre Road. A new driveway for Mamre House has also been included to provide direct access from the Banks Drive intersection, rather than Mamre Road. A new driveway for Erskine Park Rural Fire Service has also been proposed off Old Luddenham Road to replace the existing Luddenham Road access that would be impacted by the proposal.	The proposed modification would enhance features provided by the approved project, including the construction of a turning tee on the western side of Mamre Road and relocated parking for Erskine Park Rural Fire Service and the adjustments to the driveway for KFC fast food restaurant.
Close residential properties on the eastern side of Mamre Road	A noise wall has been included in the design along the eastern side of Mamre Road to minimise operational noise impacts. Additional noise mitigation treatments (at-property treatment) may be considered for individual properties, where identified to be required in accordance with the noise modelling results.	The proposed modification would not change operational noise impacts or management compared to the approved project.
Mamre Road passes through part of the South Creek floodplain	Sections of Mamre Road have been raised to satisfy flooding and drainage requirements and improve the flood immunity of the road to a one per cent AEP event. Specific safeguards and management measures that could be implemented during construction to minimise construction flood risks would be considered further during detailed design. This would include planning compound site layouts to avoid or minimise loose material storage in flood prone areas and implementation of a flood action plan (refer to project REF Section 6.5).	The proposed modification would have no additional impacts on South Creek.
Several existing utilities in the road corridor	Utility adjustment and/or protection would be carried out in consultation with the relevant utility provider (refer to project REF Section 3.5).	Additional utilities requiring adjustment are considered in the proposed modification.
Upgrading an existing operational road with minimal disturbance to traffic	Construction of the proposal would be staged with traffic switches to maintain use of Mamre Road.	The proposed modification would be staged to minimise traffic impacts. Any additional traffic control that may be required for construction workers to safely adjust utilities would consider safeguards proposed in Section 6.4.

3.2.3 Main features of the modification

Features of the proposed modification are as follows:

- The earth mound south of Mandalong Close on private property would be relocated about 20 meters further from the road corridor within the same private property. This would require extension of the approved proposal area.
- Basin filling work on the western side of Mamre Road would be required to fill the eastern edge of the existing basin south of Pine Creek Circuit. This would allow for utilities relocation and enable fencing along the property boundary. This work would be within the existing approved proposal area but would need a minor extension of the vegetation clearance boundary.
- Erskine Park Rural Fire Service would be provided with new carparking. This is because the road upgrade work would impact the existing driveway/parking, so relocation of parking would be required. Therefore, a minor extension to the proposal area has been included in the proposed modification. Construction of the parking lots would require removal of existing trees which would result in extension of the vegetation clearance boundary.
- The KFC fast food restaurant would require driveway alterations as part of property adjustment work due to the road becoming closer to the property. These driveway alterations will be to accommodate delivery vehicles entering and exiting the KFC fast food restaurant, improving connectivity with the overall project.
- Additional trees that would be impacted by construction of the approved project, as identified by an arborist, would need to be removed as part of the proposed modification. In particular, the vegetation clearance boundary would be extended for removal of a large tree on the corner of a private property at Solander Drive, and two trees north of Banks Drive, one tree north and one south of Luddenham Road. This would be necessary due to the impacts of the approved project on the tree's structural root zone. Boundary extensions would not be required for additional removal of trees that would be included within individual Property Adjustment Plans. These additional trees are located along the border of the vegetation clearance boundary and their exact locations may be just within or just outside the boundary. Tree IDs for these trees include the following (these tree IDs are also shown in Figure 1-2):

– 1083	– 828	– 130
– 899	– 812	– 173
– 900	– 810	– 166
– 774	– 723	– 165
– 772	– 635	– 158
– 798	– 431	– 157
– 765	– 296	– 13
– 838	– 243	
- The shared path which is 3.5 m wide would continue further north of Banks Drive (for about 98 metres) compared to the approved project to tie into the existing path that comes across the M4 Motorway off ramp. This would allow for pedestrian and cyclist connectivity and would require widening the approved proposal area and vegetation clearance boundary about five metres to the east.
- The proposed modification would involve the relocation of existing signage near the northern extent of the approved proposal area at the M4 westbound ramp intersection. This would be to an existing post and require minor extension of the approved proposal area to the east.
- The heritage node at Mamre House would be relocated further from Mamre Road and would include:
 - relocation of five decorative/wayfinding elements (painted logs, existing sign “Mamre”, decorative gates, memorial cairn, post and rail fence), which are currently outside the State Heritage Register (SHR) curtilage
 - interpretive signage regarding the Indigenous and Historical significance of the site
 - Indigenous garden with Cumberland Plain species
 - yarnning circle with firepit.
- An additional turning tee would be located on a maintenance access track on the western side of Mamre Road to provide maintenance access to utilities.

- A property boundary fence would be constructed to the north of Erskine Park Road along the boundary of the road widening work and would require an extension of the vegetation clearance boundary. There may be other locations where fence construction is required adjacent to vegetation where vegetation would not be cleared, however, a 0.5 metre working width would be needed to construct the fences. These locations include:
 - along the western side of Mamre Road within the approved proposal area, north of Banks Drive
 - areas on the western side of Mamre Road, opposite Alpine Circuit
 - on the western side of Mamre Road within the approved proposal area, below Meru Place and opposite areas of Madison Circuit, south to Salamander Street
 - along the approved proposal area boundary at the Erskine Park Rural Fire Service property
 - the southern side of Luddenham Road within the approved proposal area, extending south along the western side of Mamre Road.
- A number of utilities have been identified to require protection and relocation. Where excavation has the potential to be needed for utility work outside of the approved proposal area and/or vegetation clearance boundary, the boundaries have been modified in the proposed modification to allow for this work. As the detailed methodology for utility work is unknown at this stage, further environmental assessment may be required if potential additional vegetation clearing or work outside the revised vegetation clearance boundary is identified as being required. Where there is no need for additional ground disturbance, the work would be in accordance with existing maintenance activities. This is consistent with project REF Section 3.5.3 for telecommunications, where some utilities are located beyond the boundaries, but would not need boundary extensions as they are in line with regular existing maintenance in the area. These utility adjustments would involve traffic control where required. This includes:
 - utilities not requiring excavation include telecommunications:
 - along Erskine Park Road
 - on Mamre Road near James Erskine Drive
 - NBN node connections including on Lonsdale Street, Mamre Road near Ainsbury Road and on Aldan Place
 - AARnet connection and joint work near Ainsbury Road.
 - utilities that may require additional excavation outside of the approved proposal area (including to clear any potential blockages in existing conduits) include:
 - telecommunications on the east side of Mamre Road near Horseshoe Circuit
 - electrical on the east side of Mamre Road near Rotorua Road and Alpine Circuit
 - property connections (including electrical and water connections) to the existing childcare centre south of Mandalong Close
 - a water main that extends onto Walker Lane and connects to the existing main to the west, to link the existing property connection to the new main
 - three water connections on McIntyre Avenue and two on Solander Drive.

Other minor adjustments to the vegetation clearance boundary have been made after review of the design by arborists. This also includes reductions in the vegetation clearing boundary from design refinements resulting in clearing no longer being required in certain areas such as utility refinement at the northern end of Horseshoe Crescent. Adjustments to the vegetation clearance boundary would also be required as part of detailed design development to drainage channel work.

3.3 Construction activities

This section summarises the likely method, staging, work hours, plant and equipment and associated activities for construction of the proposed modification. The proposed modification would be built under Transport construction specifications under an approved construction environmental management plan (CEMP).

3.3.1 Work methodology

The construction strategy for the proposed modification would be included within the overall construction staging for the approved project. This involves construction in several stages to allow Mamre Road to remain operational during construction and minimise traffic impacts. The overall construction staging for the proposed modification is generally consistent with the project REF. It is noted that since the approved project, the early work stage of construction has been renamed to enabling work.

3.3.2 Construction hours and duration

Construction of the proposed modification would largely be carried out in accordance with the standard construction working hours defined by the *Interim Construction Noise Guideline* (ICNG; DECC, 2009), in line with the project REF:

- Monday to Friday: 7.00 am to 6.00 pm
- Saturday: 8.00 am to 1.00 pm
- Sunday and public holidays: no work.

As described in the project REF, all construction work, including work outside of standard working hours, would be carried out in accordance with:

- the allowable hours defined in the environmental protection licence (EPL) issued by the NSW Environmental Protection Authority (EPA) for the proposed modification
- road occupancy licence (ROL) conditions from the relevant roads authority, if required due to work planned on a public road
- the ICNG (DECC, 2009) and *Construction Noise and Vibration Guideline* (CNVG; Roads and Maritime Services, 2016) to minimise potential noise impacts, including community notification prior to work outside standard construction working hours.

Construction activities that may result in traffic restrictions (such as utility relocations requiring traffic control for safety) are likely to be carried out outside of standard construction working hours to minimise disruption to traffic and provide a safer working environment for construction workers.

3.3.3 Plant and equipment

Plant and equipment would be generally consistent with the description provided in Section 3.3.4 of the project REF.

3.3.4 Earthworks

Table 3-4 provides an overview of the cut and fill estimates for the project with the proposed modification compared to the original estimates as per the project REF. It is noted that design development has resulted in more accurate volume calculations compared to the previous estimates outlined in the project REF.

Minor additional areas of cut and fill would result from the proposed modification, associated with the extension of the shared path from Banks Drive to the M4, basin filling work, tree removal, property work at Erskine Park Rural Fire Service and to relocate a mound, and the adjustment of utilities which require excavation would be required.

Consistent with the project REF, additional fill material would need to be imported for the proposed modification, and not all excavated material is expected to be reused due to reuse requirements on its physical and chemical properties.

Table 3-4 Earthworks required for the proposed modification

Feature of the design	Volume (m ³) as per project REF	Volume (m ³) with proposed modification (MIE, 2023)
Material from excavations (cut)	58,000	108,000
Material required for road alignment (fill)	124,100	158,000
Total deficit of cut to fill	66,100	50,000

3.3.5 Source and quantity of materials

The type and indicative quantities of resources and materials needed to build the proposed modification along with the overall project include:

- pavement materials including:
 - about 19,120 square metres of concrete paving for the shared user path, driveway, and concrete median
 - about 5,350 cubic metres of pavement course and 3,940 square metres of heavily bound pavement course
 - about 21,080 cubic metres of lean mix concrete subbase
 - about 189,650 square metres of heavy duty dense graded asphalt and 5,100 square metres of light duty dense graded asphalt
 - about 34,900 cubic metres of selected material zone (SMZ)
 - about 3,500 cubic metres of verge
- manufactured items including:
 - about 9,750 tonnes of pre-cast concrete for the noise wall panels
 - about 12,250 metres of pre-cast or fibre-reinforced concrete pipes and pre-cast concrete box culverts
 - about 4,370 metres of Ezy-Guard steel safety barrier
- other steel and precast components for supporting road infrastructure, lighting, fencing, signage and street furniture
- natural resources such as aggregates and sand for use in concrete batching and landscaping
- water for dust suppression, concrete and watering plantings
- relatively small quantities of additional materials such as paint, oils and fuels.

Where possible, the re-use of suitable excavated material and production of materials on site would be prioritised to minimise the required quantity and transportation of imported materials. This would consider the requirements as stated in Section 4.11 of QA G36 *Environment Protection* regarding the reuse of materials.

3.3.6 Traffic management and access

The traffic management and access strategies for construction of the proposed modification would be generally the same as the approved project, including the traffic staging, use of traffic control, haulage routes, parking provision and number of vehicles expected.

Consistent with the project REF, access for emergency services would be maintained. In particular, access for vehicles to and from Erskine Park Rural Fire Service would be retained throughout construction.

Additional short-term temporary detours or traffic control may be needed for construction of the proposed modification to maintain safe access for pedestrians and cyclists until the new shared path is constructed as well as during some utility work (such as water, electrical, gas and communication utility adjustments).

3.4 Ancillary facilities

The compound sites and laydown areas required for the proposed modification would be consistent with the potential site locations identified in Section 3.4 of the project REF.

3.5 Public utility adjustment

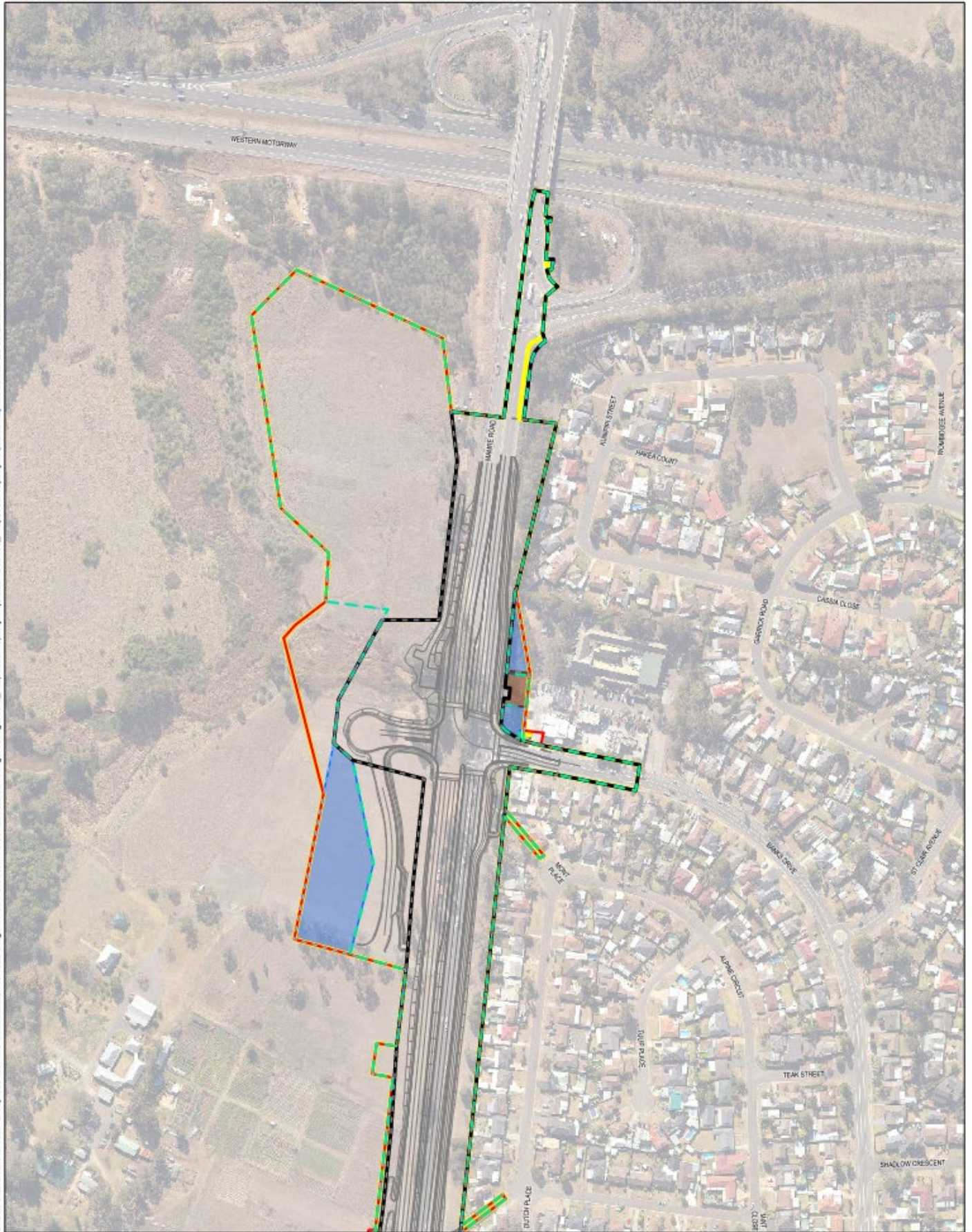
Several major utilities have been identified within the proposal area that would require adjustment and/or relocation. As a result of further consultation with relevant utility providers, the requirements for utility adjustments have been refined and are captured within the proposed modification boundary. The proposed modification would involve additional utility adjustment to those considered in the project REF. This includes a water main which would require excavation along Walker Lane beyond the approved proposal area, which would result in an extension to the boundary.

Several other utility adjustment works do not require excavation. These would involve connecting cables to existing nodes for NBN and Optus beyond the approved proposal area. This is consistent with Section 3.5.3 of the project REF which describes minor utility works required outside the approved proposal area. Additional assessment of this work is provided in Section 6.4 due to the potential need for traffic control.

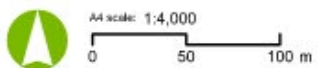
3.6 Property acquisition

Acquisition of additional properties is not required for the proposed modification as the design refinements beyond the approved proposal area are minor in nature. Property acquisition would be generally consistent with Section 3.6 of the project REF. Minor adjustments to the area of properties which may be required as part of the proposed modification would be covered by property adjustment plans. Adjustments to the acquisition boundary for the proposed modification would include a minor increase to the acquisition area on the northern corner of Solander Drive for connection of the shared user path to the existing footpath, a minor increase to accommodate the extension of the shared user path north of Banks Drive to the M4 Motorway, and an increase to relocate existing directional signage at the M4 westbound ramp intersection to an existing traffic signal post, along with slight reductions in other areas where work has been refined. Figure 3-1 shows the proposed revised property acquisition and lease boundaries for the proposed modification.

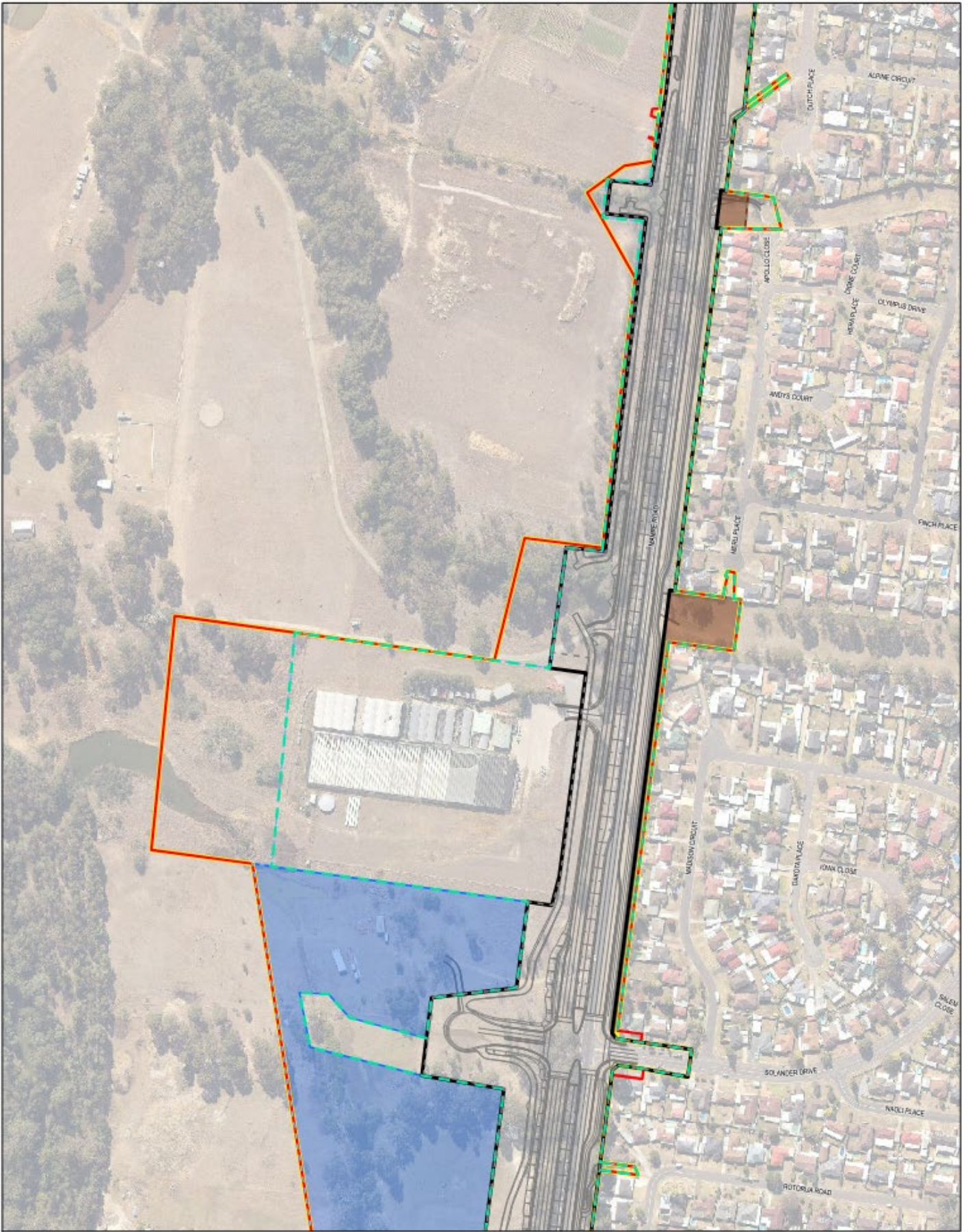
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 Proposed modification boundary	 Approved acquisition boundary
 Approved proposal area	 Proposed revised acquisition boundary
 Detailed design	 Difference between approved / revised acquisition boundary
 Approved lease boundary	 Difference between approved / revised lease boundary
 Proposed revised lease boundary	



Date: 28/08/2023 **Mamre Road upgrade between the M4 Motorway and Erskine Park Road**
 Coordinate System: GDA2020 MGA Zone 56 Figure 3-1: Proposed property acquisition



- Proposed modification boundary
- Approved proposal area
- Detailed design
- Approved lease boundary
- Proposed revised lease boundary
- Approved acquisition boundary
- Proposed revised acquisition boundary
- Difference between approved / revised acquisition boundary
- Difference between approved / revised lease boundary

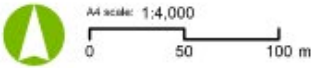
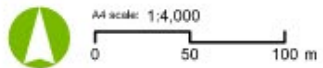
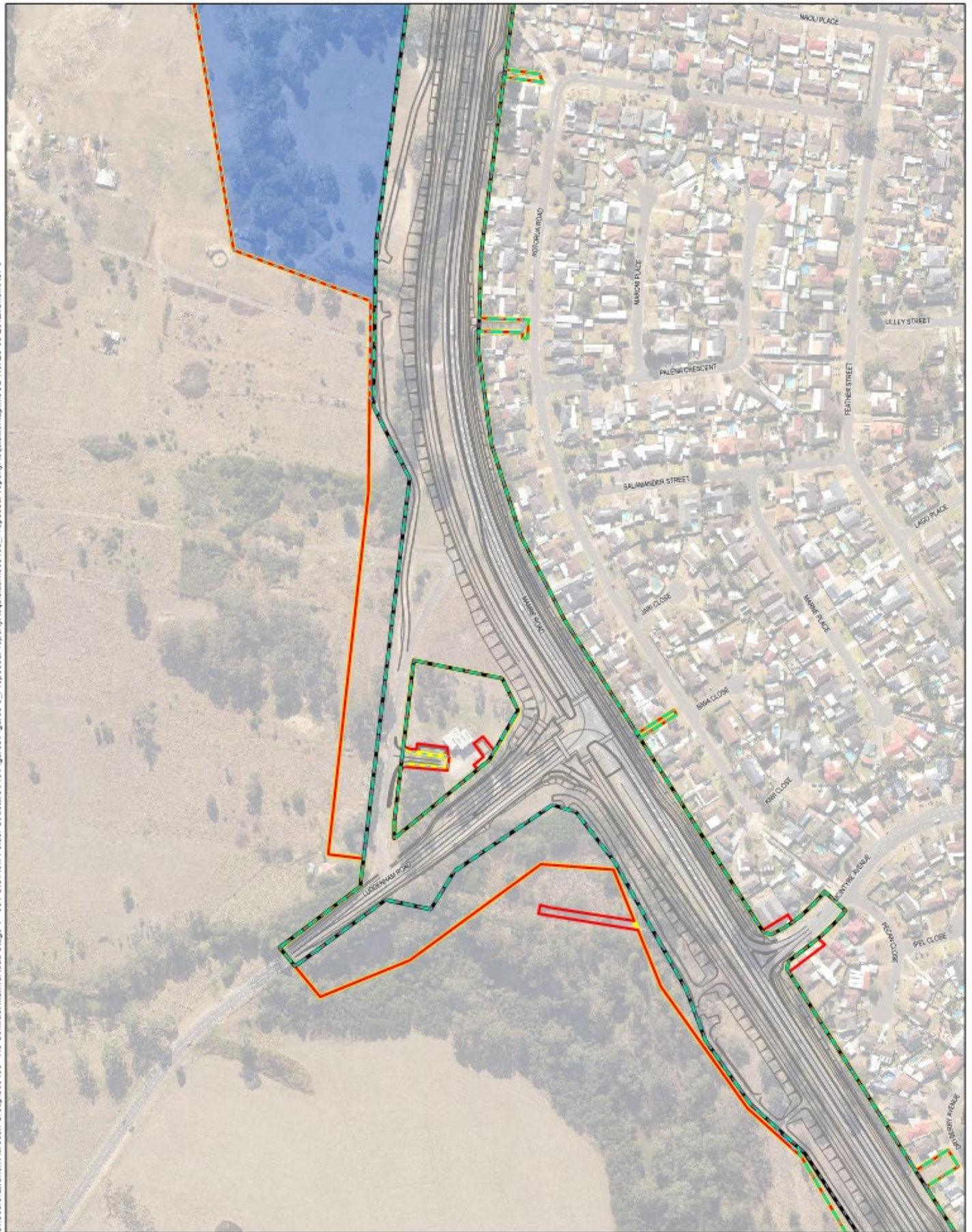


Figure 3-1: Proposed property acquisition



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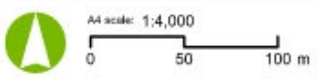
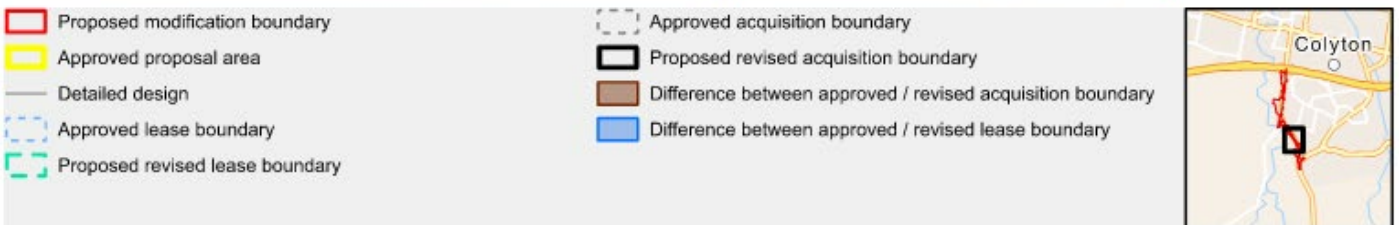
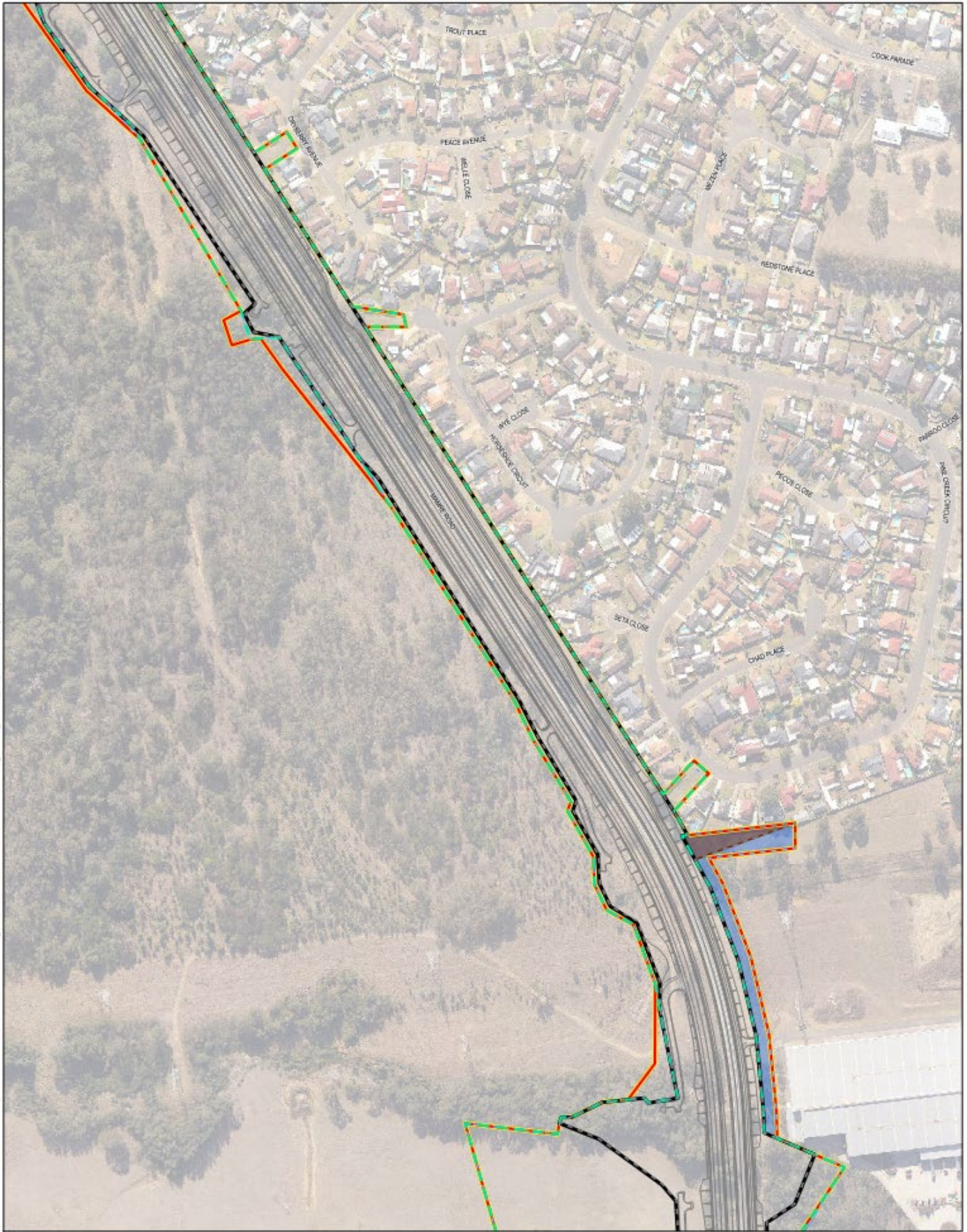
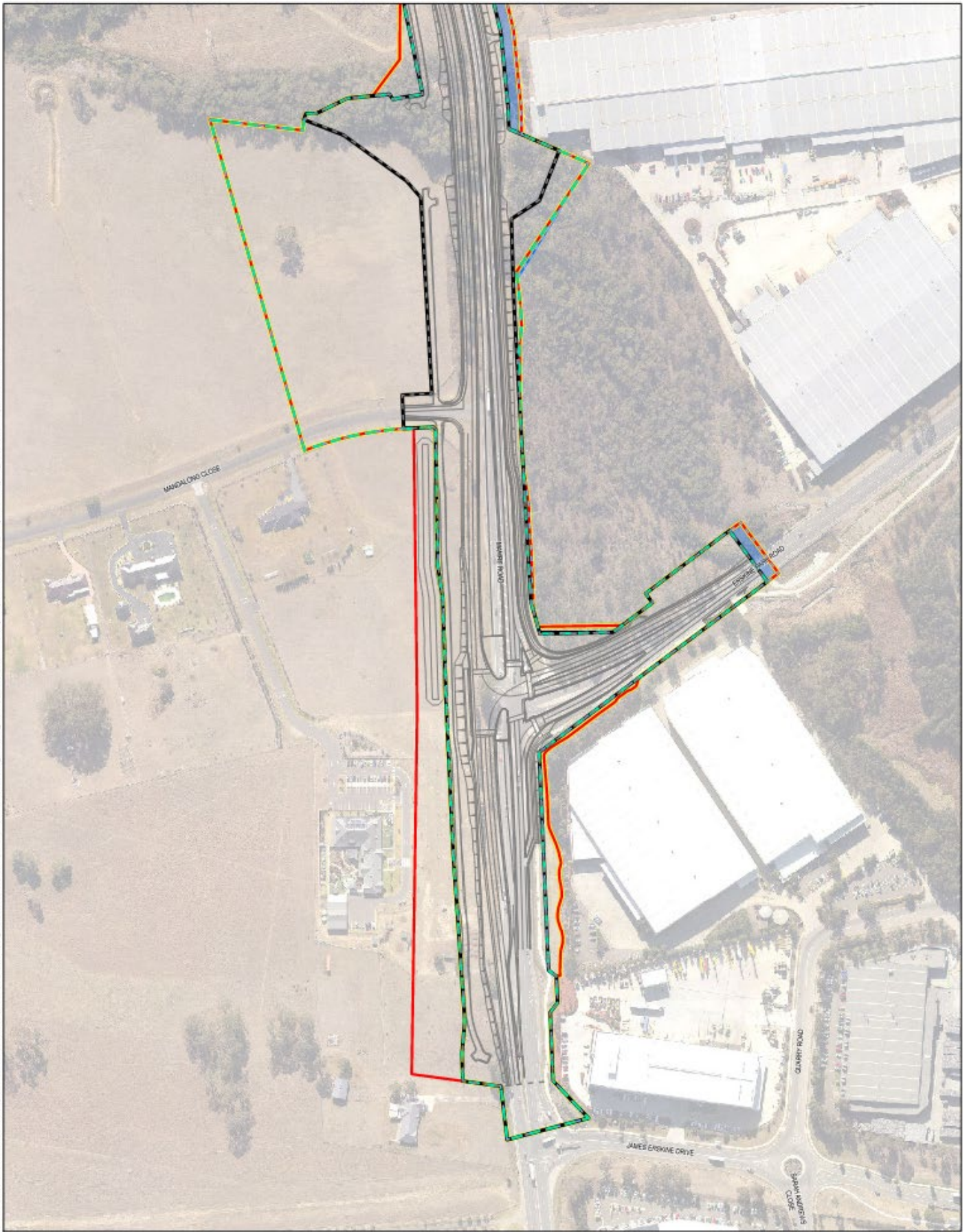


Figure 3-1: Proposed property acquisition



- Proposed modification boundary
- Approved proposal area
- Detailed design
- Approved lease boundary
- Proposed revised lease boundary
- Approved acquisition boundary
- Proposed revised acquisition boundary
- Difference between approved / revised acquisition boundary
- Difference between approved / revised lease boundary

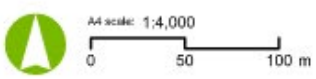


Figure 3-1: Proposed property acquisition

4. Statutory and planning framework

4.1 Environmental Planning and Assessment Act 1979

4.1.1 State Environmental Planning Policies

State Environmental Planning Policy (Transport and Infrastructure) 2021 (Transport and Infrastructure SEPP)

Chapter 2 (Infrastructure) of the Transport and Infrastructure SEPP aims to facilitate the effective delivery of infrastructure across the State.

Section 2.109 of the Transport and Infrastructure SEPP permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent.

As the proposed modification is for a road and is to be carried out by Transport, it can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

The proposed modification is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not require development consent or approval under:

- State Environmental Planning Policy (Resilience and Hazards) 2021
- State Environmental Planning Policy (Planning Systems) 2021
- State Environmental Planning Policy (Precincts – Central River City) 2021
- State Environmental Planning Policy (Precincts – Eastern Harbour City) 2021
- State Environmental Planning Policy (Precincts – Regional) 2021
- State Environmental Planning Policy (Precincts – Western Parkland City) 2021.

Section 2.10 to 2.15 of the Transport and Infrastructure SEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development.

Consultation, including consultation as required by the Transport and Infrastructure SEPP (where applicable), is discussed in Chapter 5 of this addendum REF.

State Environmental Planning Policy (Industry & Employment) 2021 (Industry & Employment SEPP)

The SEPP (Western Sydney Employment Area) 2009 has been repealed since publication of the project REF and replaced by the Industry & Employment SEPP. The southernmost portion of Mamre Road is included in the SEPP. This includes land use zones mainly classified as SP2 Infrastructure. The small portion of the proposed modification boundary that includes Erskine Park Road is classified as IN1 General Industrial area, and a small area also includes C2 Environmental Conservation. The proposed modification boundary in these areas which are included in Chapter 2 of the Industry & Employment SEPP are also covered by the approved proposal area.

Chapter 2 of the Industry & Employment SEPP aims to protect and enhance the Western Sydney Employment Area. Clause 2.32(1) states “This Chapter does not restrict or prohibit, or enable the restriction or prohibition of, the carrying out of any development, by or on behalf of a public authority, that is permitted to be carried out without consent, or that is exempt development, under the State Environmental Planning Policy (Infrastructure) 2007.”

As such, the Industry & Employment does not apply where it imposes controls that are inconsistent with the Transport and Infrastructure SEPP. However, the Industry & Employment SEPP is still relevant in identifying land use objectives, potential land use impacts and planning policy conflicts and as such, has still been considered for the area of the proposed modification that falls within the SEPP.

Table 4-1 outlines how the proposed modification is consistent with the objective of each zone in the Industry & Employment SEPP.

Table 4-1 Consistency of the proposed modification with the Industry & Employment SEPP land zones

Zone	Objectives of zone	Consistency of the proposed modification with objectives
SP2 Infrastructure	<ul style="list-style-type: none"> To provide for infrastructure and related uses To prevent development that is not compatible with or that may detract from the provision of infrastructure. 	The proposed modification is consistent with the zone objectives as it would involve an upgrade to road infrastructure within this zone. There is no change from the approved project.
C2 Environmental Conservation	<ul style="list-style-type: none"> To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values To prevent development that could destroy, damage or otherwise have an adverse effect on those values. 	There would be a minor extension to the vegetation clearance boundary to include a small provision for fence construction on the north side of Erskine Park Road.
IN1 General Industrial	<ul style="list-style-type: none"> To facilitate a wide range of employment-generating development including industrial, manufacturing, warehousing, storage and research uses and ancillary office space To encourage employment opportunities along motorway corridors, including the M7 and M4 To minimise any adverse effect of industry on other land uses To facilitate road network links to the M7 and M4 Motorways To encourage a high standard of development that does not prejudice the sustainability of other enterprises or the environment To provide for small-scale local services such as commercial, retail and community facilities (including childcare facilities) that service or support the needs of employment-generating uses in the zone. 	The proposed modification within this zone would be consistent with the work in the approved project. This work is in line with these objectives as the upgrade to Mamre Road (including the Erskine Park Road intersection) within this zone would improve access to employment generating development within the Western Sydney Employment area as well as the M4 Motorway to the north of the proposed modification.

State Environmental Planning Policy (Precincts – Western Parkland City) 2021

State Environmental Planning Policy (Western Sydney Aerotropolis) 2020 has been repealed and superseded by the State Environmental Planning Policy (Precincts – Western Parkland City) 2021.

Chapter 4 of the State Environmental Planning Policy (Precincts – Western Parkland City) 2021 applies to land within and surrounding the Western Sydney Aerotropolis. This does not include the proposed modification, thus, the development controls outlined in the SEPP do not apply. However, the proposed modification is located about one kilometre north-east of the area in the Western Sydney Aerotropolis land application map. Thus, this SEPP has been considered as it contributes to the need for the proposed modification as the Western Sydney Aerotropolis would increase future traffic volumes in the proposed modification boundary (refer to Chapter 2).

State Environmental Planning Policy (Resilience and Hazards) 2021

State Environmental Planning Policy No 55 – Remediation of Land has been repealed and superseded by State Environmental Planning Policy (Resilience and Hazards) 2021. Chapter 4 of the SEPP aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. The proposed modification boundary includes 11 areas where asbestos containing material (ACM) was identified within the project REF. Consistent with the project REF, any remediation work would be carried out in accordance with Chapter 4 of the Resilience and Hazards SEPP, including prior notification to Penrith City Council if Category 2 remediation work is proposed.

4.1.2 Local Environmental Plans

Penrith Local Environmental Plan 2010

The proposed modification is located within the Penrith Local Government Area (LGA). As the proposed modification is to be assessed under Division 5.1 of the EP&A Act, the development controls outlined within the Penrith LEP do not apply, however, the LEP has still been considered. Table 4-2 outlines the objectives of these zones, and how the proposed modification is aligned with these objectives.

The proposed modification would remain within the same land use zones as the approved project and would be consistent with the objectives of each zone as described in project REF Section 4.1.2.

Table 4-2 Consistency with zone objectives – Penrith LEP

Zone	Objectives of zone	Consistency of the proposed modification with objectives
SP2: Infrastructure	<ul style="list-style-type: none"> To provide for infrastructure and related uses To prevent development that is not compatible with or that may detract from the provision of infrastructure. 	The proposed modification is consistent with the objectives of this zone as it would involve an upgrade to road infrastructure within this zone, and related uses including an extension of the shared path.
RE1: Public Recreation	<ul style="list-style-type: none"> To enable land to be used for public open space or recreational purposes To provide a range of recreational settings and activities and compatible land uses To protect and enhance the natural environment for recreational purposes To ensure that development is secondary and complementary to the use of land as public open space, and enhances public use, and access to, the open space To provide land for the development of services and facilities by public authorities for the benefit of the community. 	The proposed modification in this zone would be consistent with the project REF, including maintenance of access to public recreation areas within this zone. The proposed modification would involve a relocated parking area for the Erskine Park Rural Fire Service in this zone, which is consistent with the zone objective to provide land for public authorities for community benefit.
C2: Environmental Conservation	<ul style="list-style-type: none"> To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values To prevent development that could destroy, damage or otherwise have an adverse effect on those values To protect, manage, restore and enhance the ecology, hydrology and scenic values of riparian corridors and waterways, wetlands, groundwater resources, biodiversity corridors, areas of remnant indigenous vegetation and dependent ecosystems To allow for low impact passive recreational and ancillary land uses that are consistent with the retention of the natural ecological significance. 	The proposed modification has avoided impacts to this area as far as feasible. However, adjustment to a section of water main would require localised ground disturbance to connect to the existing service. Basin filling work would also be required in this area as part of the proposed modification, and a flood impact assessment has been conducted to assess these impacts (Appendix C).

Zone	Objectives of zone	Consistency of the proposed modification with objectives
RU2: Rural Landscape	<ul style="list-style-type: none"> To encourage sustainable primary industry production by maintaining and enhancing the natural resource base To maintain the rural landscape character of the land To provide for a range of compatible land uses, including extensive agriculture To minimise conflict between land uses within the zone and land uses within adjoining zones To preserve and improve natural resources through appropriate land management practices To ensure development is compatible with the environmental capabilities of the land and does not unreasonably increase the demand for public services or public facilities. 	<p>Minimal work is proposed in this zone to maintain the rural landscape character of the land. The only additional scope of the proposed modification compared to the approved project would be to relocate the earth mound within a private property which would have no impact on public facilities beyond enabling the successful widening of Mamre Road.</p>
E4: General Industrial	<ul style="list-style-type: none"> To provide a wide range of industrial and warehouse land uses To encourage employment opportunities To minimise any adverse effect of industry on other land uses To support and protect industrial land for industrial uses To promote development that makes efficient use of industrial land To permit facilities that serve the daily recreation and convenience needs of the people who work in the surrounding industrial area. 	<p>The proposed modification is marginally located within this zone on the eastern side of Mamre Road. The proposed modification is consistent with the project REF in this zone, and with these objectives as the upgrade to Mamre Road would improve access to industrial development and provide road capacity to support growth of industrial businesses within this zone.</p>
R2: Low Density Residential	<ul style="list-style-type: none"> To provide for the housing needs of the community within a low-density residential environment To enable other land uses that provide facilities or services to meet the day to day needs of residents To promote the desired future character by ensuring that development reflects features or qualities of traditional detached dwelling houses that are surrounded by private gardens To enhance the essential character and identity of established residential areas To ensure a high level of residential amenity is achieved and maintained. 	<p>The proposed modification would be generally consistent with the project REF in this zone. Additional work would involve the need for tree removal in private properties where root zones are impacted by the approved work to maintain safety and prevent impacted trees falling. This would not involve acquisition of any properties.</p>
B6: Enterprise Corridor	<ul style="list-style-type: none"> To promote businesses along main roads and to encourage a mix of compatible uses To provide a range of employment uses (including business, office, retail and light industrial uses) To maintain the economic strength of centres by limiting retailing activity. 	<p>The proposed modification would be consistent with the project REF in this zone. The road upgrade and nearby shared user path extension would improve access for employment and support business within this zone.</p>

4.2 Other relevant NSW legislation

4.2.1 Roads Act 1993

The *Roads Act 1993* (Roads Act) provides guidance on the use and access of public roads, including procedures regarding the opening and closure of public roads. The Roads Act also classifies roads and identifies the functions of road authorities. A Road Occupancy Licence would be required from the relevant roads authority by the contractor prior to work on public roads and any temporary road closures during construction of the proposed modification. This would be unchanged from the project REF.

4.2.2 Crown Land Management Act 2016 and Crown Land Legislation Amendment Act 2017

The *Crown Land Management Act 2016* and *Crown Land Legislation Amendment Act 2017* set out the requirements for ownership, use and management of Crown Land. They describe the permissions and authorisation needed when planning the development of activities on Crown Land. They also include provisions relating to specific controls and restrictions on the development of Crown Land for Division 5.1 activities. The *Crown Land Management Act 2016* also describes the process for the acquisition of Crown Land.

Consistent with the approved project, small sections of land within the proposed modification are classed as:

- a Crown Waterway, which follows the alignment of South Creek
- a Crown Road, which are located:
 - next to the northern boundary of Compound Site 2, south of Mamre House
 - on the western side of Mamre Road between the Luddenham Road and Mandalong Close intersections.

Transport would need to secure the required lease and/or land acquisition in accordance with these Acts before starting work on a Crown Road or Crown Waterway and for ongoing ownership of the road corridor during operation.

4.2.3 Protection of the Environment Operations Act 1997

The NSW *Protection of the Environment Operations Act 1997* (POEO Act) aims to reduce pollution and manage the storage, treatment and disposal of waste within NSW. The POEO Act also introduces the requirement for environmental protection licences (EPLs) to be obtained for scheduled activities that are of a nature and scale that have a potential to cause environmental pollution.

Road construction is declared to be a scheduled activity in accordance with Clause 35, Schedule 1 of the Act if it results in one or more of the following:

- a) the extraction or processing (over the life of the construction) of more than—
 - i. 50,000 tonnes of materials in the case of premises in the regulated area or in the local government areas of Bega Valley, Eurobodalla, Goulburn Mulwaree, Queanbeyan-Palerang Regional or Snowy Monaro Regional, or
 - ii. 150,000 tonnes of material in any other case,
- b) the existence of 4 or more traffic lanes (other than bicycle lanes or lanes used for entry or exit) for a continuous length of at least—
 - i. 1 kilometre—where the road is in a metropolitan area and is classified, or proposed to be classified, as a freeway or tollway under the Roads Act 1993, or
 - ii. 3 kilometres—where the road is in a metropolitan area and is classified, or proposed to be classified, as a main road (but not a freeway or tollway) under the Roads Act 1993, or
 - iii. 5 kilometres—where the road is not in a metropolitan area and is classified, or proposed to be classified, as a main road, freeway or tollway under the Roads Act 1993.

As the proposed modification would involve an upgrade of Mamre Road, which is a classified main road under the Roads Act, over a continuous length of about 3.8 kilometres within a metropolitan area and would result in the existence of four or more traffic lanes, the proposed modification is considered a scheduled activity. As such, construction of the proposed modification would require an EPL to be obtained under the POEO Act, which is consistent with the approved project.

4.2.4 Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) is designed to protect both known heritage items (such as standing structures) and items that may not be immediately obvious (such as potential archaeological remains or 'relics'). This includes protection for items listed on the State Heritage Register (SHR), the heritage schedules of local council Local Environmental Plans (LEPs), NSW Government agency heritage and conservation registers established under section 170 of the Act as well as items subject to an Interim Heritage Order.

Section 57(1) of the Heritage Act lists the types of activities/works that require approval from Heritage NSW (a branch of the NSW Department of Premier and Cabinet) under Section 60 of the Heritage Act, when working on/in an item/place listed on the SHR. An application for an exemption can also be made under some circumstances.

The proposed modification crosses into the curtilage of a historic homestead and the associated property, known as "Mamre" which is listed on the NSW State Heritage Register (SHR Item 00264). The Statement of Heritage Impact (SOHI) prepared for the project REF identified that a Section 60 application to Heritage NSW under the *Heritage Act 1977* would be required for the proposed work within the curtilage of SHR listed Mamre House (refer to Section 6.3). This would be consistent for the proposed modification. A Section 60 application has since been applied for and approved (HMS ID 4654, 7/12/23), which details conditions for work to proceed. These conditions would be complied with for the approved project and proposed modification.

No permits are required to be obtained for the project under Section 139 and 140 of the *Heritage Act 1977*, which is consistent with the approved project.

4.2.5 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) provides for the control and management of all national parks, historic sites, nature reserves, wetlands and other state reserves. The proposed modification is not located within land reserved under the NPW Act.

The NPW Act also provides for the protection of 'Aboriginal objects' and 'Aboriginal places' and makes it an offence to harm Aboriginal objects, places or sites without permission. An Aboriginal cultural heritage assessment report (ACHAR) has been prepared for the approved project in accordance with the Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) (Roads and Maritime Services, 2011). The Aboriginal heritage study area within the ACHAR covered the proposed modification boundary. The ACHAR concluded there was potential for direct impacts to eight Aboriginal archaeological sites.

Transport applied for an Aboriginal heritage impact permit (AHIP) under section 90A of the NPW Act as per the approved project in May 2022. An AHIP was issued for Mamre Road Upgrade Stage 1 in December 2022 (AHIP 5018). The work proposed as part of the proposed modification within the approved AHIP boundary would be consistent with the completed AHIP mitigation. , No additional AHIP application is required for the proposed modification as no additional valid sites are expected to be impacted as a result of the proposed modification (refer to Section 6.2).

Safeguards and mitigation measures would also be implemented to make sure that any site not covered within an approved AHIP would be avoided during construction and operation of the project. This would include an unexpected finds procedure, which would be implemented if an unexpected find occurs to prevent any accidental damage to any additional Aboriginal objects, places or sites due to the proposed modification to those approved for impact in an AHIP.

4.2.6 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) is directed at conserving threatened species, populations and ecological communities of animals and plants. The BC Act outlines the framework for addressing impacts on biodiversity from development and clearing. It establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme.

A *Biodiversity Development Assessment Report* (BDAR) was prepared by Niche for the project REF (refer to Section 6.1 of the project REF and Appendix D to the project REF). Since then, due to the minor adjustments proposed to the vegetation clearance boundary (refer to Chapter 3), an addendum BDAR was prepared by Niche to assess any changes to the potential impacts and biodiversity offset obligation as a result of the proposed modification (provided in Appendix D and summarised in Section 6.1). The addendum BDAR was prepared in accordance with the requirements of the Biodiversity Assessment Methodology (BAM) under the BC Act.

The addendum BDAR concluded that an additional 0.35 hectares of native vegetation and associated habitat would be directly impacted by the proposed modification. No threatened flora species were identified during the field investigations for the proposed modification. The proposed modification would result in an additional 0.35 hectares of impact to two threatened biodiversity species that are regarded as 'species credits' as per the requirements of the BAM: Cumberland Plain Land Snail, and Southern Myotis.

The unavoidable impacts of the proposed modification on ecological values includes the clearing of an additional 0.35 hectares of vegetation.

Through the application of the BAM, associated guidelines and the BAM-C, the following additional biodiversity credit offsets are required to offset the unavoidable impacts:

- 7 credits for PCT 835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
- 2 credits for PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
- 9 credits for Southern Myotis
- 9 credits for Cumberland Plain Land Snail.

4.2.7 Water Management Act 2000 and Water Act 1912

The *Water Management Act 2000* (WM Act) provides for the sustainable and integrated management of water resources. Aquifer interference approval requirements under the WM Act have not yet commenced, and regulation is managed under Part 5 of the *Water Act 1912*.

Consistent with the approved project, the proposed modification would involve work within 40 metres of South Creek, which is considered a controlled activity. However, Transport is exempt from controlled activity approvals under Subdivision 4, Clause 41 of the Water Management (General) Regulation 2018 as they are a public authority. The proposed modification does not involve any water take, use or supply from natural sources or flood diversion work.

The proposed modification would not be likely to intercept groundwater aquifers during most construction activities due to the shallow nature of the earthworks required for road construction. Slightly deeper excavations may be required for work associated with installation of utilities, drainage infrastructure and the noise walls, which has potential to intercept groundwater. Any requirement for dewatering would be minor, given the small excavation scale and low permeability of the local clay soils. However, a water access licence is not required for any minor dewatering. This is because it would be subject to an exemption under the Water Management (General) Regulation 2018 as the water taken would likely be less than three megalitres in volume, would not be taken for consumption or supply and would be for a project to which Division 5.1 of the EP&A Act applies. Section 6.6 outlines the safeguards and management measures proposed to minimise impacts to water quality, including erosion and sediment controls.

Therefore, no approvals or licences are required for the proposed modification under the *WM Act* or *Water Act 1912*.

4.2.8 Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) provides for the identification, conservation and recovery of threatened fish, aquatic invertebrates and marine vegetation. One of the key objectives of the FM Act is to conserve fish stocks and key fish habitats.

Part 7 of the FM Act establishes that a permit is generally required to dredge, reclaim, obstruct fish passage, harm marine vegetation, use explosives or electrical devices in a waterway that is classified as key fish habitat. Some requirements are also captured by the Transport Code of Practice with Fisheries. It is noted that any dredging work or any reclamation work carried out by a public authority is exempt from Division 3 of Part 7 of the Act if the work is carried out in accordance with the Code of Practice for Minor Works in NSW Waterways under the Fisheries Management (General) Regulation 2019.

South Creek is mapped as key fish habitat, which is located within the proposed modification boundary at its nearest point near Luddenham Road.

Any 'dredging and/or reclamation work' would be consistent with the project REF including construction of headwalls for drainage pipes. Written notice in regards to dredging and/or reclamation work was submitted in relation to Section 199 of the FM Act on 21 February 2022 for the approved project. NSW Department of Primary Industries – Fisheries (DPI Fisheries) have

confirmed that no application for a permit under the FM Act is likely to be required for the approved project. As the proposed modification would not increase the extent of work near South Creek, the proposed modification would not result in any additional consultation or permit requirements under the FM Act.

4.2.9 Biosecurity Act 2015

The *Biosecurity Act 2015* requires Transport to control, remove and eradicate weeds on land that they own to avoid further growth and spreading. Several weed species were observed within proposal area during field survey. The weed species commonly found were Cobblers Pegs (*Bidens pilosa*), Dandelion (*Taraxacum officinale*), Common Sowthistle (*Sonchus oleraceus*), Scarlet Pimpernel (*Lysimachia arvensis*), African Lovegrass (*Eragrostis curvula*), Green Cestrum (*Cestrum parqui*) and Fireweed (*Senecio madagascariensis*). Section 6.1.2 of the project REF outlines the Priority and High Threat Exotic weeds that were recorded during field survey for the proposal and their associated duties under the *Biosecurity Act 2015*. Section 6.1.4 of the project REF includes safeguards and management measures to manage these weeds in accordance with the *Biosecurity Act 2015* during construction and operation of the proposal. No additional weed species have been identified for the proposed modification. Therefore, no additional safeguards and management measures are required for the proposed modification.

4.2.10 Waste Avoidance and Resource Recovery Act 2001

The *NSW Waste Avoidance and Resource Recovery Act 2001* (WARR Act) promotes the waste hierarchy to avoid resource consumption and implement resource recovery in the form of material reuse and recycling in preference to waste disposal. The Act acknowledges that certain materials present either human or environmental risk, requiring classification, treatment and disposal in accordance with specific waste management provisions. Waste generated during construction and operation of the proposed modification would be managed in accordance with the waste hierarchy and where required, disposed of in accordance with its waste classification and relevant legislation and guidelines.

4.2.11 Land Acquisition (Just Terms Compensation) Act 1991

The *Land Acquisition (Just Terms Compensation) Act 1991* was developed to ensure just terms for owners of land that is acquired by an authority of the State when land is not available for public sale. The Act promotes the requirement for compensation to be no less than the market value of the land at the date of acquisition.

Property acquisition from government agencies, the Crown and private landholders required for the proposed modification would be consistent with the approved project. This would be required to accommodate the permanent aspects of the proposed modification including the new road and associated infrastructure. All land acquisitions would be carried out in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*.

4.2.12 Local Government Act 1993

The *Local Government Act 1993* outlines the legal framework, responsibilities and powers of local government within NSW. The proposed modification is located within the Penrith City LGA.

The *Local Government Act 1993* establishes two classifications for council owned and managed land: operational land and community land. The approved project includes areas classified as community land along the eastern side of Mamre Road, which would be impacted by the proposed noise wall, batters, culverts and swales. Some community land is also within the proposed modification boundary. Division 2 of the Act outlines several procedures and restrictions regarding the use and management of community land. Transport will continue to consult with Penrith City Council regarding council owned land and assets. The design refinements as part of the proposed modification aimed to minimise impacts on community land, where possible.

4.3 Commonwealth legislation

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

Under the EPBC Act a referral is required to the Australian Government for *proposed 'actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land'*. These are considered in Appendix A and Section 6 of the addendum REF.

Findings – nationally listed biodiversity matters

The proposed modification is likely to result in a significant impact on threatened species, ecological communities or migratory species, within the meaning of the EPBC Act.

A referral is not required for proposed road actions that may affect nationally listed threatened species, endangered ecological communities and migratory species. This is because requirements for considering impacts to these biodiversity matters are the subject of a strategic assessment approval granted under the EPBC Act by the Australian Government in September 2015.

This addendum REF has been prepared to meet the requirements of the EPBC Act strategic assessment approval for Transport for NSW Division 5.1 road activities. Potential impacts to these biodiversity matters are also considered as part of Section 6.1 of the addendum REF and Appendix A.

Findings – matters of national environmental significance (other than biodiversity matters)

The assessment of the proposed modification's impact on matters of national environmental significance and the environment of Commonwealth land found that there would be no change to the findings of the determined activity and would be unlikely to cause a significant impact on matters of national environmental significance (other than biodiversity matters) or the environment of Commonwealth land. A referral to the Australian Department of Climate Change, Energy, the Environment and Water is not required.

4.3.2 Native Title Act 1993

The *Native Title Act 1993* recognises and protects native title. The Act covers actions affecting native title and the processes for determining whether native title exists and compensation for actions affective native title. It establishes the Native Title Registrar, the National Native Title Tribunal, the Register of Native Title Claims and the Register of Indigenous Land Use Agreements, and the National Native Title Register. Under the Act, a future act includes proposed public infrastructure on land or waters that affects native title rights or interest.

A search of the Native Title Tribunal Native Title Vision website was carried out in March 2023, with no Native Title holders/claimants identified.

4.4 Confirmation of statutory position

The proposed modification is categorised as development for the purpose of a road and is being carried out by or on behalf of a public authority. Under Section 2.109 of the Transport and Infrastructure SEPP, the proposed modification is permissible without consent. The proposed modification is not State significant infrastructure or State significant development. The proposed modification can be assessed under Division 5.1 of the EP&A Act. Consent from Council is not required.

5. Consultation

5.1 Consultation strategy

Section 2.109 of the Transport and Infrastructure SEPP provides that “development on behalf of a public authority for the purpose of a road or road infrastructure facilities may be carried out without consent” providing that certain key parties are consulted and/or notified about the work. Consultation requirements identified in the Transport and Infrastructure SEPP were met in the project REF.

The consultation strategy relevant to the proposed modification remains consistent with Section 5.1 of the project REF, which includes an implementation of a Community and Stakeholder Engagement Plan (CSEP). Public display of this addendum REF to gather comments for submissions reporting was not considered necessary given that the amendments the proposed modification would make to the approved project would be minor in scale, and extensive consultation regarding the overall project that has been undertaken to date.

Project information, project updates, including details on the proposed modification, community updates and media releases are regularly published on the Transport Mamre Road upgrade webpage ([Mamre Road upgrade between the M4 Motorway, St Clair and Erskine Park Road, Erskine Park | Transport for NSW](#)).

5.2 Consultation outcomes

Consultation was previously undertaken with government agencies, stakeholders, the Aboriginal community, and with affected residents on private properties surrounding the approved project.

Penrith City Council and the NSW State Emergency Service were consulted to meet the Transport and Infrastructure requirements as outlined in Section 5.4 of the project REF. Appendix B contains a consultation checklist that documents how SEPP (Transport and Infrastructure) consultation requirements have been identified. There would be no change to the findings of the proposed modification compared to the approved project.

Following display of the project REF, community and government issues raised were addressed in the submissions report for the project.

Additional consultation has occurred during refinement of the project during detailed design, which has informed the proposed modification scope. This included additional targeted consultation with Penrith City Council, utility providers and relevant property owners regarding specific design items that affect their property or assets (including where trees would be removed, and where the mound would be relocated, along with the property work around Mamre House and Erskine Park Rural Fire service).

Due to the minor changes in scope of the proposed modification compared to the approved project, no additional widespread consultation was required for this addendum REF.

Appendix B contains a consultation checklist that documents how the consultation requirements under SEPP (Precincts – Western Parkland City) have been identified.

5.3 Ongoing or future consultation

Ongoing consultation, community updates and notification in advance of road closures or night works for the proposed modification would be consistent with Section 5.6.2 of the project REF. Future consultation for the proposed modification includes an additional safeguard for pre-construction consultation with Erskine Park Rural Fire Service and the KFC fast food restaurant described in Section 6.4.4.

This addendum REF will be made available on the Transport website, so that the community and stakeholders are informed about what is being proposed.

6. Environmental assessment

This section of the addendum REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposed modification of the Mamre Road upgrade project. All aspects of the environment potentially impacted upon by the proposed modification are considered. This includes consideration of the guidelines *Roads and Related Facilities EIS Guideline* (DUAP, 1996) and *Is an EIS required?* (DUAP, 1999) as required under Section 171 of the Environmental Planning and Assessment Regulation 2021. The factors specified in Section 171(2) of the Environmental Planning and Assessment Regulation 2021 are also considered in Appendix A.

Site-specific safeguards and management measures are provided to ameliorate the identified potential impacts.

6.1 Biodiversity

This section describes the biodiversity impacts that may occur when constructing and operating the proposed modification.

6.1.1 Methodology

A *Biodiversity Development Assessment Report* (BDAR) was prepared by Niche for the project REF (refer to Section 6.1 of the project REF and Appendix D to the project REF) to assess the potential biodiversity impacts during construction and operation of the project. This assessment included a desktop review of biodiversity databases and site inspections in accordance with the Biodiversity Assessment Methodology and threatened biodiversity survey guidelines of the proposal area. Due to the minor adjustments proposed to the vegetation clearance boundary (refer to Chapter 3), an addendum BDAR was prepared by Niche to assess any changes to the potential impacts and biodiversity offset obligation as a result of the proposed modification (provided in Appendix D).

An ecological field inspection of the proposed modification was carried out by Niche on the 10th of July 2023. The survey was required to assess the minor adjustments proposed to the vegetation clearance boundary.

The addendum BDAR also included updates to BAM-C.

6.1.2 Existing environment

The plant community types (PCTs) within the biodiversity study area are consistent with those identified in Section 6.1.2 of the project REF.

6.1.3 Potential impacts

Construction

The design changes described in Chapter 3 have resulted in minor adjustments to the vegetation clearance boundary compared to the boundary assessed in the approved project (as amended in the submissions report).

Table 6-1 summarises the changes in the magnitude of impacts in hectares expected as a result of the revised vegetation clearance boundary since the submissions report.

Table 6-1 Summary of changes in biodiversity impacts expected from revised vegetation clearance boundary

Biodiversity impact	Original impact (ha)	Revised impact (ha)	Difference (ha)
Removal of native vegetation, which comprises:	9.30	9.65	0.35
• PCT 849 Cumberland Plain Woodland (Medium condition)	3.68	3.73	0.05
• PCT 849 Cumberland Plain Woodland (Low condition)	0.93	1.04	0.11
• PCT 835 River-flat Eucalypt Forest (Medium condition)	2.97	3.16	0.19
• PCT 835 River-flat Eucalypt Forest (Low condition)	1.25	1.25	0.00
• PCT 1800 Swamp Oak Floodplain Forest (Medium condition)	0.47	0.47	0.00
Impact on threatened species habitat			
Cumberland Plain Land Snail	3.46	3.81	0.35
Southern Myotis	5.94	6.29	0.35

The proposed modification is unlikely to increase aquatic impacts associated with the approved project as the location of the additional vegetation disturbance is predominately located away from riparian areas, and is of a minor scale that would not change the impact assessment conclusions in the BDAR in the project REF. Basin filling work on the western side of Mamre Road would be required to fill the eastern edge of the existing basin south of Pine Creek Circuit. This existing basin was dry at the time of the field survey. The closest natural watercourse is about 80 metres to the south of the basin. Based on the proposed scope of the basin fillings work, it is unlikely to result in any significant impact to aquatic biodiversity or significant impacts to the filling and aquatic degradation of any natural watercourse.

No other changes to the biodiversity impacts compared to those outlined in the approved project have been identified.

Overall, the additional direct biodiversity impacts would not change the conclusions regarding the significance of impacts compared to the approved project.

Operation

The proposed modification is unlikely to change the impacts expected during operation compared to the approved project given the relatively small amount of additional clearing and no notable increase in indirect impacts expected.

Conclusion on significance of impacts

While the approved project is likely to significantly impact threatened species, populations or ecological communities or their habitats within the meaning of the BC Act or FM Act, the additional impact of the proposed modification on these items is not significant.

The additional impacts of the proposed modification is not likely to significantly impact any additional threatened species, populations, ecological communities or migratory species, within the meaning of the EPBC Act compared to those outlined in the project REF.

6.1.4 Safeguards and management measures

Safeguards B1 to B17 as per the approved project remain appropriate to address the biodiversity impacts of the proposed modification. No additional safeguards and management measures would be required due to the proposed modification.

Other safeguards and management measures that would address biodiversity impacts are identified in Section 7.2, including those associated with soil and water quality and noise and vibration.

Biodiversity offsets

As detailed in the BDAR, the BC Act together with the Biodiversity Conservation Regulation 2017 outlines the framework for assessment of biodiversity impacts and introduces a Biodiversity Offset Scheme (BOS). The BDAR uses the BAM established under these biodiversity reforms to provide a methodology for determining the number and type of biodiversity credits required to offset biodiversity impacts.

Although efforts have been made to avoid, minimise and mitigate potential ecological impacts from the proposed modification, some residual impacts would occur. The proposed modification's biodiversity offset obligation for impacts on biodiversity values were determined using the BAM-C. The required ecosystem and species credit obligations are provided in the BDAR (in Appendix D).

Through the application of the BAM, associated guidelines and the BAM-C, the following additional biodiversity credit offsets are required for the proposed modification:

- 7 credits for PCT 835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
- 2 credits for PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
- 9 credits for Southern Myotis
- 9 credits for Cumberland Plain Land Snail.

6.2 Aboriginal cultural heritage

This section describes the Aboriginal cultural heritage impacts that may occur when constructing and operating the proposed modification.

6.2.1 Methodology

An Aboriginal cultural heritage assessment report (ACHAR) was prepared by Kelleher Nightingale Consulting for the project REF (refer to Section 6.2 of the project REF and Appendix E to the project REF) to assess the potential Aboriginal cultural heritage impacts during construction and operation of the approved project. This assessment was prepared in accordance with Transport's Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI). It included a desktop review of the Aboriginal Heritage Information Management System (AHIMS) database, archaeological test investigations and consultation with registered Aboriginal parties. An Aboriginal Heritage Impact Permit (AHIP) application was submitted for approved project in May 2022 and an AHIP was issued for Mamre Road Upgrade Stage 1 in December 2022 (AHIP 5018).

Additional assessment was carried out by Kelleher Nightingale Consulting for the proposed modification to assess the design changes and consistency with the existing ACHAR and AHIP for the approved project. The additional areas of the proposed modification boundary outside the approved proposal area were inspected and assessed by Matthew Kelleher on 15 and 17 August 2023. Additional investigation, including test excavation, of two AHIMS registered items (MWP-AD8 and MWP-IF1) was also carried out by Kelleher Nightingale Consulting to confirm their status as Aboriginal sites.

6.2.2 Existing environment

The proposed modification boundary is within the Aboriginal heritage study area that was assessed in the ACHAR for the project REF. The Aboriginal heritage study area was larger than the approved proposal area as it included a suitable buffer to allow for design changes and refinements.

An updated AHIMS search was carried out on 17 August 2023 for the proposed modification boundary. This updated search identified no additional AHIMS sites within the proposed modification boundary beyond those identified in the project REF.

No artefacts or previously unidentified Aboriginal archaeological sites were identified during the additional archaeological survey for the proposed modification.

The proposed modification boundary covers three additional Aboriginal items registered on the Aboriginal Heritage Information Management System (AHIMS) compared to the approved proposal area (refer to Table 6-2).

Table 6-2 Identified AHIMS registered items within the proposed modification boundary but outside the approved proposal area

Site name	AHIMS ID	Significance	Type	Status
MWP-AD7	45-5-4812	N/A	Not a site	N/A
MWP-AD8	45-5-4811	Low	Subsurface archaeological deposit	Destroyed
MWP-IF1	45-5-4810	Low	Surface isolated artefact	Destroyed

The registered locations of MWP-AD8 (AHIMS 45-5-4811), and MWP-IF1 (AHIMS 45-5-4810) were inspected to identify any surface artefacts that may have been present and assess the potential for intact subsurface archaeological deposits. No artefacts were identified at the site locations, and they were assessed as having no potential for intact Aboriginal archaeological deposits due to extensive disturbance from past land use. Following further investigation, the site status of these items has been updated to be 'destroyed'. This has been confirmed by a further updated AHIMS extensive search on 19 December 2023.

6.2.3 Potential impacts

Construction

The archaeological sites located within the approved project area were assessed as exhibiting low and moderate archaeological significance. The proposed changes would not increase the impact of the project on the eight Aboriginal archaeological sites identified within the approved project area.

The proposed impacts to the five Aboriginal archaeological sites within the approved project area (Mamre Road AFT 1-5) are consistent with the findings of the existing Mamre Road Upgrade Stage 1 - Aboriginal Cultural Heritage Assessment (KNC 2021b). No further assessment or mitigation is required for Aboriginal archaeological sites with the boundary of AHIP 5018.

The approved project area overlapped an area that has been previously assessed for Aboriginal cultural heritage values and is already covered under an existing AHIP for the M4 Motorway (AHIP C0002113). Any work related to the proposed modification undertaken within the existing AHIP area would be required to comply with the existing AHIP conditions.

Additional refinements to the approved project area occurred after AHIP 5018 was issued. The design refinements reduced the proposed construction impact area in relation to the approved project area at several Aboriginal archaeological sites. A program of archaeological salvage excavation and community collection was undertaken within the construction boundary between January and March 2023 in accordance with the conditions of AHIP 5018. The construction boundary was cleared of Aboriginal heritage on 31 March 2023. The addendum study area encompasses portions of the approved project area (and AHIP 5018) which were outside the construction boundary prior to April 2023. A review of the salvage excavation results indicates that the addendum area within AHIP 5018 but outside of the construction boundary is consistent with the completed AHIP mitigation program. No further mitigation is required for Aboriginal archaeological sites within the addendum study area bound by AHIP 5018.

The proposed modification boundary would extend to include the subsurface archaeological deposit MWP-AD7 (45-5-4812) which was identified in the ACHAR. The approved project was refined to avoid impacts to this site. MWP-AD7 is of low archaeological significance but would be impacted by the proposed modification due to its location where the mound would be relocated south of Mandalong Close. The harm to this site would change from no impact as per the approved project, to direct total impact. However, since the project REF, the AHIMS status of MWP-AD7 has been updated to 'not a site'. Thus, no AHIP is needed for impacts to MWP-AD7.

Some of the proposed changes occur directly adjacent to areas mapped as Potential Archaeological Deposits (PADs) such as where the basin filling work are proposed. The turning tee on the maintenance access track on the western side of Mamre Road would be within Mamre Road AFT 4. These design refinements would remain within the approved proposal area that was assessed in the ACHAR as being impacted. Therefore, the impacts to these PADs have already been considered within the ACHAR for the REF and no additional impact is expected as a result of the proposed modification.

As both sites MWP-AD8 and MWP-IF1 have been confirmed since the project REF as being destroyed and not valid, no additional assessment or AHIP application is required for the proposed modification as impacts on these additional sites do not represent a constraint.

As the same remaining AHIMS sites occur within the approved proposal area as the proposed modification boundary, no further construction impacts are expected.

Operation

No Aboriginal heritage items or places are likely to be impacted during operation of the proposed modification.

6.2.4 Safeguards and management measures

Safeguards AH1 to AH11 remain appropriate to address the Aboriginal cultural heritage impacts of the proposed modification. AH2 has been updated to include the AHIMS number for two sites which had their AHIMS registration pending at the time the project REF was prepared.

ID	Impact	Environmental safeguards	Responsibility	Timing	Relevant construction stage	Reference
AH2	Aboriginal heritage	<p>An Aboriginal Heritage Impact Permit (AHIP) will be sought under section 90A of the NPW Act for Aboriginal sites with expected direct impacts (excluding the area within the boundary of existing AHIP C0002113) prior to construction. This is likely to include (subject to design refinement):</p> <ul style="list-style-type: none"> Mamre Road 1 (AHIMS 45-5-3167) Mamre Road AFT 1 (AHIMS 45-5-5337) Mamre Road AFT 2 (AHIMS 45-5-5336) Mamre Road AFT 3 (AHIMS 45-5-5335) Mamre Road AFT 4 (AHIMS 45-5-5489) Mamre Road AFT 5 (AHIMS 45-5-5490) Mamre Road IF 1 (AHIMS 45-5-5338) MWP-AD5/MWP-AD6 (AHIMS 45-5-4815/45-5-4813). 	Transport	Detailed design / pre-construction	N/A	Additional safeguard

6.3 Non-Aboriginal heritage

This section describes the non-Aboriginal heritage impacts that may occur when constructing and operating the proposed modification.

6.3.1 Methodology

A non-Aboriginal heritage Statement of Heritage Impact – Mamre Road Upgrade Stage 1 (referred to as 'the SOHI') was prepared by Aurecon for the project REF (refer to Section 6.3 of the project REF and Appendix F to the project REF). This assessment included a review of statutory heritage lists and past heritage studies and a site inspection of the proposal area. A

review of the statutory heritage lists within the proposed modification boundary was conducted for this proposed modification.

Following this, an Addendum Statement of Heritage Impact (referred to as ‘Addendum SOHI’) has been prepared by Transport to support the Section 60 application for proposed impacts on Mamre House (refer to Section 4.2.4) and supplement the SOHI to provide more detail on how the project proposes to respond to Mamre House’s heritage values and the design of the ‘heritage node’.

6.3.2 Existing environment

The existing environment would be consistent with Section 6.3.2 of the project REF as the proposed modification does not encroach within or near any additional non-Aboriginal heritage items. The SOHI assessed the below five heritage items:

- Mamre House, which is listed on the State Heritage Register (SHR) #00264, Penrith Local LEP #228 and section 170 register #3490022
- Marsden Memorial Cairn, which is listed on the Penrith LEP #229
- Luddenham Road Alignment, which is listed on the Penrith LEP #230
- Blaxland Memorial Cairn, which is listed on the Penrith LEP #230
- Leeholme Horse Stud Rotunda, which is listed on the Penrith LEP #232.

6.3.3 Potential impacts

Construction

The Addendum SOHI provides a further assessment of the potential heritage impacts on Mamre House resulting from the proposed modification which would commence during construction, due to the proposed adjustments to existing elements in the area and the proposed establishment of the relocated heritage node. Table 6-3 summarises the affected elements, their significance to Mamre House, and the proposed work as described in the Addendum SOHI (Transport, 2023).

Table 6-3 Potential heritage impacts on Mamre House (Addendum SOHI, Transport 2023b)

Element	Significance	Proposed work	Heritage impact
1. Decorative wooden and metal gates	Moderate – reconstruction of earlier style, constructed between 1975 and 1984.	Relocated as a key feature within the heritage node	Negligible – current location is not historically significant.
2. Sandstone ‘Marsden’ memorial cairn	High - The cairn is significant as a local memorial to Samuel Marsden dating from 1938 by the citizens of St Marys. It was assessed in the SOHI and is one of two (the second links to Blaxland on Luddenham Road).	Relocated as a key feature within the heritage node	Minor – the cairn will be moved from its original location, however the new location will allow it to be interpreted in the context of the Heritage Node.
3. Painted logs	Moderate – a 20 th century interpretive landscaping element.	Relocated from outside the heritage curtilage into the heritage node	Negligible – current location is not historically significant.
4. Decorative entrance sign to Mamre	Moderate – a 20 th century interpretive wayfinding and decorative element.	Relocated from outside the heritage curtilage into the heritage node	Negligible – current location is not historically significant.

Element	Significance	Proposed work	Heritage impact
5. 'Catholic Care' entrance sign	Low - the sign is modern and unrelated to Mamre.	Removed	Positive – removal of non-significant visual clutter at the entrance to Mamre will maintain open viewscape.
6. Small section of post and rail fence	High - a remnant of this type of fencing that contributes to the entrance into Mamre. It holds some aesthetic significance to Mamre adding to the visual setting of this rural property.	Relocated into the heritage node	Minor – the section of fence will be moved from its original location, however the new location will allow it to be interpreted in the context of the Heritage Node.

The proposed modification would also not change the area of minor impacts to the Luddenham Road Alignment. The property work at Erskine Park Rural Fire Service would be adjacent to Luddenham Road Alignment, but not overlap it. Thus, the impact to this locally listed heritage item would remain low. Blaxland Memorial Cairn and Leeholme Horse Stud Rotunda would remain unaffected by the proposed modification.

Operation

The revised heritage interpretation node proposed at Mamre House would be generally consistent with the approved project but would be located further from the road. This refined location has been informed by specialist heritage advice and would improve heritage interpretation outcomes by moving the heritage node to a quieter area less disturbed by operation of the road. The assessment of potential non-Aboriginal heritage impacts of the revised heritage interpretation node have been summarised in Table 6-3 above as these impacts would commence in construction and continue during operation of the project.

TfNSW has obtained the Section 60 approval (HMS ID 4654, 7/12/23), outlining conditions for proceeding with the work. During the detail design review, it was noted that the current urban design plans may obstruct the visual connection between Mamre House and the road, contrary to the terms of Section 60 Condition #3 – *Landscaping*:

“3. The Mamre Conservation Management Plan states that vegetation along the fence line of Mamre along Mamre Road should be instated to assist to buffer the property from new development and noise. The vegetation should be low height shrubs which maintain views of the property from the road and be within 1 metre of the fence line to limit the potential for archaeological impacts. Consistent with the CMP, the introduction of such screening vegetation is to be considered in the project landscape design, subject to consultation with the property owner.

Reason: To ensure significant fabric including vegetation is protected during construction.”

To comply with Condition 3 and preserve the significant rural view centred on Mamre House, TfNSW proposes to adjust the current proposed planting. This will ensure an unobstructed vista from the road, focusing on Mamre House, by relocating the proposed planting from the centre of the SHR curtilage and grouping it with plantings proposed at each side, all within 1 meter of the existing rural fence.

Continued consultation with Heritage NSW will be necessary to ensure compliance with the Section 60 conditions. Additionally, it may be necessary to submit a Modification to Approved Work Application (Section 65a) to address any potential updates in line with regulatory requirements.

An additional safeguard has been proposed to address this change.

6.3.4 Safeguards and management measures

Safeguards NAH1 to NAH7 as per the approved project remain appropriate to address the non-Aboriginal cultural heritage impacts of the proposed modification. No additional safeguards and management measures would be required due to the proposed modification. The conditions outlined in the Section 60 approval (HMS ID 4654) for the proposed impact on Mamre House would also be required to be complied with for the proposed modification. An additional safeguard has been proposed to fulfill Section 60 Condition #3:

NAH8 – The urban design plan will be updated to guarantee that the significant rural view on Mamre House remains unaltered. Consultation with Heritage NSW regarding the proposed design change is required.

6.4 Traffic and transport

This section describes the traffic, transport and access impacts that may occur when constructing and operating the proposed modification.

6.4.1 Methodology

A traffic and transport impact assessment was prepared by SMEC (2021) for the project REF (refer to Section 6.4 of the project REF and Appendix G to the project REF) to assess the potential traffic and transport impacts during construction and operation of the approved project. A review of this assessment was carried out for the proposed modification.

Further modelling for operation of the proposed modification was considered unnecessary as the proposed modification would not alter the configuration of the road network from the approved project.

6.4.2 Existing environment

The existing road and traffic conditions for the proposed modification would be generally consistent with Section 6.4.2 and Appendix G of the project REF. The project submissions report extended the proposal area north of the original proposal area as per the project REF. This was to allow for adjustments to three street light lanterns beside the existing Mamre Road corridor at the northern extent of the proposal area.

The proposed modification includes an extension to the proposal area to extend the shared path north of Banks Drive to the M4 Motorway. This would widen the eastern edge of the boundary where the proposal area was previously extended in the submissions report for the street lantern adjustments. At present, there is a designated pedestrian path along Mamre Road between Banks Drive and the M4 Motorway with no provision for cyclists. Sections of this path are narrow and directly adjacent to the existing road corridor (posing potential safety hazards with proximity to passing vehicles).

There would be three existing NBN nodes and two existing Optus nodes ranging from about 4 meters to 960 meters beyond the proposed modification boundary which would require adjustment as per the proposed modification. The areas these would affect are:

- James Erskine Drive about one meter from the northern side of the footpath (opposite side to the road), just south of the proposed modification boundary
- Erskine Park Road opposite Lenore Drive, about one meter from the northern side of the footpath (opposite side to the road), east of the proposed modification boundary
- Aldan Place connecting to the kerb at the end of a residential driveway, east of the proposed modification boundary
- a grassed area beside Mamre Road north of the M4 Motorway near Ainsbury Road, north of the proposed modification boundary
- the left of two westbound lanes on Lonsdale Street towards Mamre Road, north of the proposed modification boundary.

6.4.3 Potential impacts

Construction

The proposed modification would involve extending the shared path north of Banks Drive to the M4 and relocation of existing signage to a different existing post. There may be potential short term negative impacts to active transport users that use the existing path on Mamre Road between Banks Drive and the M4 while this additional work is carried out. The potential impacts of this work would be managed by REF mitigation measure TT8 which outlines that detours would be implemented to minimise impacts associated with temporary access changes for pedestrians. To allow for the temporary access changes for pedestrians, there may be additional traffic control measures necessary for motor vehicles.

The proposed modification would also involve traffic control associated with utilities adjustments. These adjustments would be minor and involve cable pulling work to existing communications nodes by asset owners. Some of these are located beyond

the proposed modification boundary, however, would be consistent with existing maintenance activities in the area. Similar utilities adjustment work beyond the approved REF boundary are described in Section 3.5 of the project REF.

The impacts of the additional utility adjustment work involved in the proposed modification on traffic and transport are expected to be temporary and localised during construction and associated with any short-term traffic control and access changes (such as temporary alternate access arrangements for any properties directly affected by the work) where these adjustments would occur. There may be short-term delays and an increase of travel time where the utility adjustments would occur along existing road networks. Most utility work would occur in the earliest stages of construction where Mamre Road traffic would remain in the current existing arrangement. Therefore, the additional utility adjustments would likely have a minor negative impact to the traffic and transport of the existing road network. Impacts would be mitigated and managed in accordance with the traffic and transport mitigation measures outlined in the Section 7.2 of the project REF.

The proposed modification includes a relocated parking area for Erskine Park Rural Fire Service off Old Luddenham Road. Similarly, the KFC fast food restaurant would require driveway alterations as part of property adjustment work due to a change in road levels and lane widths that result in a wider driveway being required. There would be temporary access impacts to these properties during construction. Safeguard TT10 has been amended to reflect the need for pre-construction consultation with Erskine Park Rural Fire Service and the KFC fast food restaurant prior to any work that may temporarily restrict access.

Other impacts including changes to the road network during construction, impacts from construction vehicles accessing the site, impacts on bus services, safety, and impacts on property access and parking would be consistent with the approved project.

Operation

Operational traffic performance would be consistent with the project REF as the proposed modification does not involve changes to the road design. Extending the shared path north of Banks Drive to the M4 Motorway would have a positive impact by improving the road safety and suitability of Mamre Road for pedestrians and cyclists. The addition of screening and shade along the proposed shared path would improve the amenity of the locality, encouraging more people to walk or cycle which would improve Mamre Roads connectivity with the community.

6.4.4 Safeguards and management measures

Approved safeguards TT1 to TT9 and TT11 to TT14 are considered adequate to address the traffic and transport impacts of the proposed modification. Safeguard TT10 has been strengthened to include the need for consultation with Erskine Park Rural Fire Service and the KFC fast food restaurant prior to construction due to the proposed temporary access impacts to these properties.

Table 6-4 Amendments to traffic and transport safeguards and management measures

ID	Impact	Environmental safeguards	Responsibility	Timing	Relevant construction stage	Reference
TT10	Property access	Property access will be maintained where feasible and reasonable and property owners (including Erskine Park Rural Fire Service and Mamre House and the property owner at Aldan Place) will be consulted before starting any work that may restrict or control access. <u>Where temporary access impacts would occur due to construction of the relocated parking to the Erskine Park Rural Fire Service, and driveway adjustment at the KFC fast food restaurant, consultation with the landholders would occur prior to work.</u>	Contractor	<u>Pre-construction</u> / construction	Enabling work / main construction work	Additional safeguard

6.5 Hydrology and flooding

This section describes the hydrology and flooding impacts that may occur when constructing and operating the proposed modification.

6.5.1 Methodology

A Hydrology and Hydraulic Assessment was prepared by Aurecon for the project REF (refer to Appendix H of the project REF) to assess the potential hydrology and flooding impacts during operation.

Additional assessment was carried out for the proposed modification and summarised in *Technical Memorandum: Flood Impact Assessment Addendum REF – Basin Filling Works* prepared by SMEC that is attached as Appendix C. The purpose of the additional assessment was to assess the impact of proposed modification on flood behaviour, with a focus on the basin filling work, and to identify risks on potential adverse flood impact outcomes as a result of the proposed modification. Flood modelling was carried out as part of the assessment to investigate any potential changes to flood behaviour associated the design changes, with the inclusion of the basin filling work.

6.5.2 Existing environment

The existing environment for the proposed modification would be consistent with Section 6.11.1 of the project REF.

6.5.3 Potential impacts

The existing basin volume is estimated to have a total volume of 120 m³ which will reduce to 103 m³ after basin filling work.

Appendix C provides an assessment on the impacts of the proposed modification as a result of storage loss by partially filling the existing basin, which would begin during construction and continue during operation of the project. The assessment identifies minor changes in the extent of flood level increases from the existing in the 0.02 metre to 0.05 metre range for the 1% Annual Exceedance Probability (AEP) flood. This minor increase in flood extent is localised within 6 metres of the existing inlet stream of this existing basin. Figure 2 of Appendix C shows the 1% AEP local flood level impacts for the proposed modification.

More frequent floods such as the 10% and 2% AEP events would result in similar flood extents as the 1% AEP flood impacts. As a result of basin filling work from the proposed modification, there is a minor increase in impacts in the 0.05 metre to 0.10 metre range in the 5% AEP flood event. Figure 3 of Appendix C shows the 5% AEP local flood level impacts for the proposed modification.

The area where flood impacts occur are situated within dense vegetation where no dwellings, buildings or major infrastructure exist. As increases in flood levels and extents are minor and occur in densely vegetated land, any additional flood impacts compared to the approved project are considered inconsequential.

Flood velocity impacts were also assessed to determine if changes in flood velocity as a result of the proposed modification increases the risk of erosion to the flood plain for local and mainstream flood. For local and mainstream flood events, the proposed modification design would result in no adverse impact on the risk to erosion as all regions would experience a change in velocity below the local flood erodibility threshold. As noted in Appendix C, the effect of basin filling work during the operation of the proposed modification would result in a negligible impact to the risk of erosion to the flood plain and to design embankments for the local overland flood and the mainstream regional South Creek flood.

As noted in Appendix C, flood modelling has confirmed that the full length of the proposed modification would remain immune to the 1% AEP flood in both Local Flood and Mainstream Flood events during operation. Therefore, the basin filling work from the proposed modification would not affect immunity requirements of the approved project.

6.5.4 Safeguards and management measures

Safeguards HF1 to HF2 as per the approved project remain appropriate to address the hydrology and flooding impacts of the proposed modification. No additional safeguards and management measures would be required due to the proposed modification.

6.6 Soil and water quality

This section describes the water quality and soil impacts that may occur when constructing and operating the proposed modification.

6.6.1 Methodology

The methodology involved a review of Section 6.6 and Appendix I of the project REF, also the Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI) prepared for the project REF. The proposed modification would be within the surface water study area and groundwater study area outlined in Section 6.6.1 and Appendix I of the project REF. The mound that would be relocated south of Mandalong Close was considered as part of the water quality and soil impact assessment as its current location is within the REF proposal area.

The mound was also previously tested for asbestos using test pits on 16th December 2020 as noted in the DSI. No asbestos was found in the samples. Thus, it was considered unnecessary to pursue further testing of the mound for this addendum REF.

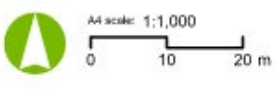
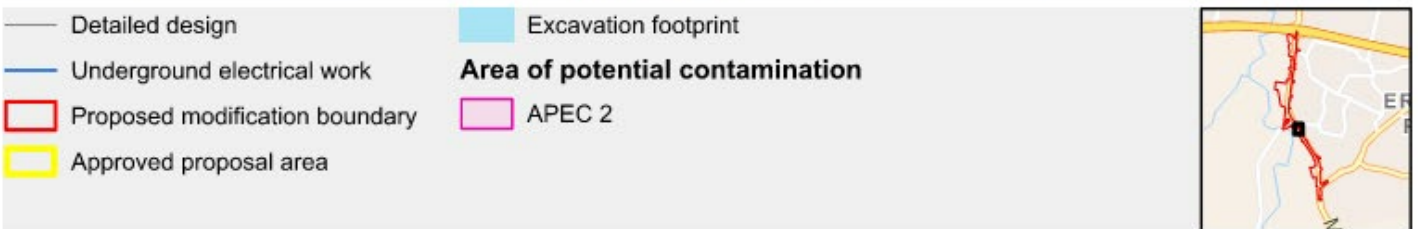
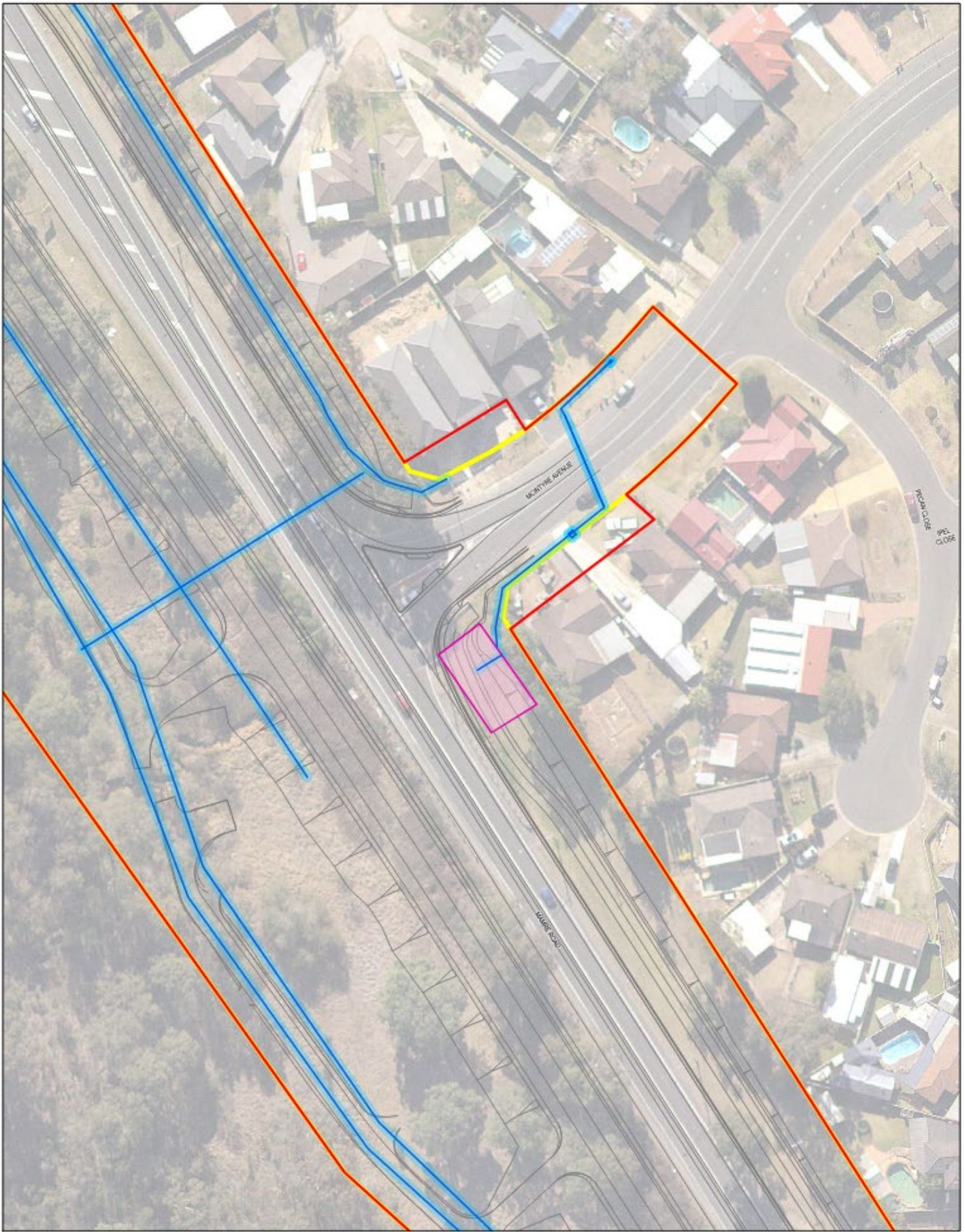
6.6.2 Existing environment

The existing water quality and soil environment relevant to the proposed modification is generally consistent with the description in Section 6.6.3 of the project REF. This would include South Creek which is mapped as key fish habitat, and four identified Areas of Potential Environmental Concern (APECs) within the approved proposal area.

6.6.3 Potential impacts

Construction

The proposed modification would include areas beyond those considered in contamination investigations within the Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI) carried out for the project REF. One area where excavation would be required for underground electrical work is located within APEC 2. Figure 6-1 identifies the proposed underground electrical work near and within APEC 2. This APEC is completely contained within the approved proposal area. While there is a potential contamination risk due to the proximity of this underground electrical work to the APEC, the increase in risk would be negligible compared to the project REF as this area would also be disturbed by the road widening work approved in the project REF. As such, existing safeguards SW5 to SW7 would be appropriate to manage work near this APEC.



Excavation for a new water main along Walker Lane would also extend further away from South Creek than the approved project. This excavation would be about 100 meters from an area of South Creek classified as key fish habitat. However, this excavation would be minor in extent and managed by existing safeguards to control potential erosion and sedimentation, which would minimise potential soil and water quality impacts from this work.

The proposed modification is unlikely to require excavations that are deep enough to intercept groundwater. Therefore, no additional impacts on groundwater are expected due to the proposed modification. In the unlikely event that groundwater is intercepted due to the proposed modification (such as during slightly deeper excavations for installation of utilities), any potential impacts on groundwater would be minimised and managed in accordance with the Soil and Water Management Plan prepared as part of the CEMP.

The remainder of the proposed modification would result in similar impacts to South Creek as the approved project, with no additional direct disturbance to South Creek proposed during construction of the proposed modification. The construction of the parking lots at Erskine Park Rural Fire Service would be about 140 meters away from South Creek, and the relocation of the earth mound would be over 150 meters from South Creek. The basin on the western side of Mamre Road that is proposed to be filled in the proposed modification is about 80 metres north of a natural watercourse that leads into South Creek. This work has potential to create sediment runoff during activities such as earthworks and transportation of materials to site. However, any additional impacts on soil and water quality would be minimised through implementation of safeguards and would be minor compared to those anticipated for the approved project due to the small scale of the changes in the proposed modification.

Operation

Operational impacts to water quality from road runoff associated with the proposed modification are expected to be consistent with the project REF as there would be no change in road configuration or traffic flow. There would be a minor increase in paved area due to the extension of the shared path towards the M4 Motorway, which may marginally increase road runoff that could migrate to South Creek. There may also be a slight change in water flows associated with the filling of the basin on the western side of Mamre Road (this basin was observed to be dry during biodiversity field surveys for the proposed modification). However, this would have negligible additional impacts on water quality compared to the approved project. The impact of the proposed filling of the basin on water flows and flooding is discussed further in Section 6.5.

6.6.4 Safeguards and management measures

Safeguards SV1 to SV16 as per the approved project are considered adequate to address the soil and water quality impacts of the proposed modification. No additional measures are proposed.

6.7 Noise and vibration

This section describes the noise and vibration impacts that may occur when constructing and operating the proposed modification. No additional measures are proposed.

6.7.1 Methodology

A Noise and Vibration Assessment was prepared by SLR for the project REF (refer to Section 6.7 and Appendix J of the project REF). This assessment included identification of noise sensitive receivers, monitoring of existing background noise levels (including concurrent traffic counts) and noise modelling using SoundPLAN V8 software. In addition to this, an Operational Traffic Noise Report (OTNAR) was prepared by SLR (May, 2023), which refined the noise findings of the original Noise and Vibration Assessment prepared for the project REF as per the standard process to reassess noise during detailed design.

No additional noise monitoring or modelling was required to assess the proposed modification beyond that carried out for the project REF.

6.7.2 Existing environment

The existing noise and vibration environment is comprised of nine noise catchment areas (NCAs). The NCAs relevant to the proposed modification are consistent with that described in Section 6.7.2 of the project REF.

6.7.3 Potential impacts

Construction

Some sensitive receivers may experience temporary increased noise or vibration impacts from construction of the proposed modification associated with construction activities moving slightly closer to them compared to than the approved project, including during:

- the additional utilities adjustments located outside of the approved proposal area required during construction
- the extension of the shared path at the northern extent of the proposed modification boundary
- the relocation of the mound closer to the residential dwelling on Mandalong Close
- additional tree removal close to residential dwellings on the eastern side of Mamre Road, including the dwelling at the corner of Solander Drive and Mamre Road
- relocation of the heritage node closer to Mamre House, which may slightly increase the construction noise experienced by employees and visitors at Mamre House during this work.

Most notably, the distance to the dwelling nearest to the mound on Mandalong Close has been reduced by approximately half from the project REF, which would result in the worst-case construction noise and vibration impacts being slightly higher for the duration of this work. However, these activities would be short-term in duration and minor in scale, so any additional noise and vibration impacts would be minor compared to the overall construction noise and vibration from the approved project. Notification of any potentially noise and vibration affected receivers would occur prior to construction in accordance with project REF measure NV2. Mitigation measures would be implemented to appropriately manage any additional noise and vibration impacts of the work including notifying businesses affected by work (GEN2), scheduling works for daytime hours where possible and providing respite periods (NV5).

The other aspects of the proposed modification are not expected to result in any additional noise and vibration impacts compared to the approved project.

Operation

The proposed modification is not expected to result in any additional operational noise or vibration impacts compared to the approved project. The operational traffic noise impacts of the proposed modification would be consistent with those outlined in the OTNAR (SLR, 2023).

6.7.4 Safeguards and management measures

Safeguards NV-1 to NV-11 as per the approved project are considered adequate to address the noise and vibration impacts of the proposed modification. No additional safeguards and management measures would be required for the proposed modification.

6.8 Landscape character and visual impacts

This section describes the landscape character and visual impacts that may occur when constructing and operating the proposed modification.

6.8.1 Methodology

An urban design report including landscape character and visual impact assessment was prepared by Scape Design for the project REF (refer to Section 6.8 of the project REF and Appendix K to the project REF) to assess the potential landscape character and visual impacts. This assessment included identification of the visual catchment and landscape character zones (LCZ) for the project, a site inspection and assessment in accordance with Transport guidelines.

No additional viewpoints or LCZs were needed to assess the proposed modification beyond those carried out for the project REF. No additional site inspections were required.

6.8.2 Existing environment

The existing environment is consistent with the description provided in Section 6.8.2 and Appendix K of the project REF as the proposed modification is generally in the same location as the approved project and would remain within the same LCZs identified for the project REF.

6.8.3 Potential impacts

Construction

The proposed modification (particularly the extension of the shared path on Mamre Road between Banks Drive and the M4 Motorway) would marginally increase the area in which construction work would be visible. However, any additional construction work would be short-term and result in a negligible increase in landscape character and visual impacts due to its small scale and same general location as the construction work required for the approved project.

Operation

Some additional vegetation and trees would be removed during construction of the proposed modification, potentially resulting in less visible vegetation to residents and road users during operation. This could have a minor negative impact on the landscape character of the area. However, the approved project already requires removal of vegetation in the same general area as the proposed modification to facilitate the road widening, and therefore any additional impact on landscape and visual character would be minor.

The earth mound south of Mandalong Close on private property would be moved further from the road corridor within the same private property. This would be in zone LCZ-6 rural residential and would have a negligible operational visual impact. The mound relocation would be more visible towards viewpoint 9 and would maintain the same visual barrier from the road for the residential receiver of the property on which it is located. The mound would be less prominent from the road corridor.

The extended shared path would be in LCZ-1 residential estate and increase the visible amount of infrastructure in this area. However, the operation of the path would align with this zone which contains existing pedestrian paths and therefore any change in landscape character or additional visual impact from the additional path would be negligible.

The basin filling work, property work at Erskine Park Rural Fire Service, and utility adjustments would be very minor in scale and are not expecting to result in any additional landscape character or visual impacts compared to the approved project.

The relocation of the heritage node within the approved proposal area to an area further from the road corridor would have a minor positive visual impact due to its improved location. The node would be in LCZ-4 Heritage/pastoral and improve connectivity with the existing heritage structure (Mamre House).

The relocation of existing signage near the northern extent of the approved proposal area to an existing post would have a minor positive visual impact, this is due to the increased visibility of signage for motorists using the ramp at the M4 Motorway.

6.8.4 Safeguards and management measures

Safeguards LV1 to LV7 as per the approved project are considered adequate to address the landscape character and visual impacts of the proposed modification. No additional measures are proposed.

6.9 Air quality

This section describes the air quality impacts that may occur when constructing and operating the proposed modification.

6.9.1 Methodology

An Air Quality Impact Assessment was prepared by SLR for the project REF (refer to Section 6.9 and Appendix L of the project REF) to assess the potential air quality impacts during construction and operation of the project.

No additional air quality modelling was required to assess the proposed modification beyond that carried out for the project REF.

6.9.2 Existing environment

The existing air quality environment for the proposed modification would be consistent with Section 6.9.3 and Appendix L of the project REF.

6.9.3 Potential impacts

Construction

Excavation and ground disturbance work associated with the proposed modification such as the relocation of the mound, utilities adjustments, tree removal, and property work such as to construct relocated parking at Erskine Park Rural Fire Service may cause minor and temporary amounts of dust to be generated. However, this work would be minor in comparison to the overall extent of earthwork required for construction of the approved project and any additional air quality impacts would be negligible.

Operation

The proposed modification would not result in any changes in potential operational air quality impacts compared to those outlined in Section 6.9.4 of the project REF.

6.9.4 Safeguards and management measures

Safeguards AQ-1 to AQ-4 as per the approved project are considered adequate to address the air quality impacts of the proposed modification. No additional measures are proposed. Safeguard AQ-3 has been revised to reflect the change from the NSW Department of Planning and Environment (DPE) to the NSW Department of Climate Change, Energy, the Environment and Water.

6.10 Socio-economic, property and land use

This section describes the socio-economic, property and land use impacts that may occur when constructing and operating the proposed modification.

6.10.1 Methodology

A socio-economic impact assessment was prepared for the project REF (refer to Section 6.10 of the project REF and Appendix M to the project REF) to assess the potential socio-economic, property and land use impacts. The assessment was consistent with a 'moderate' level assessment as specified by Transport's Environmental Impact Assessment Practice Note – Socio-economic Assessment (EIA-N05) (Transport, 2020e). A desktop review of the boundary changes from the proposed modification was conducted for this assessment.

6.10.2 Existing environment

The existing environment is consistent with the description provided in Section 6.10.3 and Appendix M of the project REF as the proposed modification is generally in the same location as the approved project and would remain within the three study areas identified for the project REF.

6.10.3 Potential impacts

Construction

The potential socio-economic impacts of temporary detours from the extension of the shared path and utilities adjustments would be consistent with the project REF, including alternative temporary pathways behind safety barriers in construction areas. Changes to the road network for residents during construction would be consistent with the approved project. There would be minor additional temporary disruption to land used for rural, public recreation areas and residential use as a result of the proposed modification.

There would be minor changes in the acquisition and lease areas to accommodate the extension of the shared user path to the M4 Motorway, the connection of the path to the existing path at Solander Drive, and signage relocation at the M4 westbound ramp intersection. The design refinements beyond the approved proposal area are minor in nature and do not extend into any additional private properties. As a result, no additional properties would be required to be acquired or leased as a result of the proposed modification, however some of the acquisition areas within existing properties have changed as noted in Section 3.6. All property acquisition would be carried out as detailed in Section 3.6 of the project REF.

Operation

The extension of the shared path may improve access and connectivity for pedestrians and cyclists during operation and this may lead to benefits to commercial properties from improved connectivity for pedestrians. There would be minor additional changes to land used for rural and public recreation areas as they are changed to road corridor use as a result of the proposed modification.

6.10.4 Safeguards and management measures

Safeguards SE-1 to SE-11 are considered adequate to address the socio-economic, property and land use impacts of the proposed modification. No additional measures are proposed.

6.11 Other impacts

6.11.1 Existing environment and potential impacts

Environmental factor	Existing environment	Potential impacts
Waste and resources	The existing environment for the proposed modification would be consistent with Section 6.11.1 of the project REF.	Quantities and types of waste generated would not be significantly different from the approved project due to the minor scale of the changes included in the proposed modification.
Greenhouse gases and climate change	The existing environment for the proposed modification would be consistent with Section 6.11.1 of the project REF.	The potential additional greenhouse gas emissions from construction of the proposed modification would be negligible compared to the approved project due to its relatively minor scale. The extension of the shared path may encourage more people to walk or cycle instead of use cars for local trips, which may reduce local greenhouse gas emissions during operation.
Utilities	The proposed modification boundary includes some additional sections of existing utilities, which have been identified during detailed design as being potentially required to be adjusted (refer to Section 3.2.3).	While there is the potential that additional utilities may require excavation outside of the approved proposal area, the potential impacts as a result of this would be consistent with the approved project and any utility work would be carried out in consultation with the relevant utility provider.
Hazards and risk management	The existing environment for the proposed modification would be consistent with Section 6.11.1 of the project REF.	The proposed modification is unlikely to result in any changed impacts associated with bushfire risk during construction or the transportation, handling and storage of small quantities of hazardous materials and dangerous goods (such as paint and fuels).

6.11.2 Safeguards and management measures

Safeguards O-1 to O-13 are considered adequate to address the other impacts of the proposed modification. No additional measures are proposed.

6.12 Cumulative impacts

6.12.1 Potential impacts

The proposed modification would not result in any changes in cumulative impacts from those assessed in Section 6.12 of the project REF.

Since preparation of the project REF, a number of other projects have been determined in the vicinity of the proposed modification. Endeavour Energy is planning on beginning construction of 132 kV electrical utilities at approximately the same time as the proposed modification. These utilities would interface within the southern extent of the proposed modification boundary on the western side of Mamre Road beginning at Erskine Park Road and proceeding south.

In addition, four of these other projects are warehouse and manufacturing facilities south of the proposed modification boundary. These include:

- Snack Brands Manufacturing Facility (about 100 metres south of the proposed modification)
- ARDEX Warehouse and Manufacturing Facility (about 1.2 kilometres south of the proposed modification)
- Kemps Creek Warehouse, Logistics and Industrial Facilities Hub (about 1.5 kilometres south of the proposed modification).
- Aspect Industrial Estate (about 2.8 kilometres south of the proposed modification).

The timing of construction of these projects may overlap with the construction of the proposed modification. This would have cumulative impacts with the proposed modification including increased construction traffic in the area and tree removal for construction of buildings. These projects would also result in minor increases in noise and dust generated during their construction. The proposed modification would have negligible cumulative impacts in combination with construction of these industrial facilities. Early consultation with these private developers is required to understand their timeframes and how to manage potential interface work.

During operation, the proposed modification would support potential increases in traffic volumes travelling to these facilities through enabling the upgrade of Mamre Road to a dual carriageway and improving pedestrian and cyclist connectivity.

The Sydney Metro - Western Sydney Airport would be constructed approximately 2.5 kilometres north and one kilometre west of the proposed modification. This would provide a new metro line to service Western Sydney International (Nancy-Bird Walton) Airport, and the Western Sydney Aerotropolis. This would also cause a temporary increase in traffic from construction vehicles. However, the Sydney Metro - Western Sydney Airport project may help control expected increases in traffic along Mamre Road during operation by supporting travel to the future Western Sydney Airport.

6.12.2 Safeguards and management measures

Safeguards CU-1 to CU-3 are considered adequate to address the cumulative impacts of the proposed modification. No additional measures are proposed.

7. Environmental management

7.1 Environmental management plans (or system)

A number of safeguards and management measures have been identified to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposed modification. Should the proposed modification proceed, these management measures would be addressed if required during detailed design and incorporated into the Project Environmental Management Plan (PEMP) and Contractors Environmental Management Plan (CEMP) and applied during the construction and operation of the proposed modification.

7.2 Summary of environmental safeguards and management measures

Environmental safeguards and management measures for the Mamre Road upgrade project are summarised in Table 7-1. Additional or revised safeguards and management measures identified in this addendum REF are included in **bold** and underlined font. The safeguards and management measures have and will continue to be incorporated into the detailed design phase of the proposed modification, the CEMP and the PEMP and implemented during construction and operation of the proposed modification, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the proposed work on the surrounding environment.

Table 7-1: Summary of safeguards and management measures

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
GEN1	General - minimise environmental impacts during construction	<p>A CEMP will be prepared and submitted for review and endorsement of the Transport Environment Manager prior to commencement of the activity.</p> <p>As a minimum, the CEMP will address the following:</p> <ul style="list-style-type: none"> any requirements associated with statutory approvals details of how the project will implement the identified safeguards outlined in the REF issue-specific environmental management plans roles and responsibilities communication requirements induction and training requirements procedures for monitoring and evaluating environmental performance, and for corrective action reporting requirements and record-keeping procedures for emergency and incident management procedures for audit and review. <p>The endorsed CEMP will be implemented during the undertaking of the activity.</p>	Contractor / Transport	Detailed design / pre-construction / construction	Enabling work / main construction work	Standard safeguard
GEN2	General - notification	All businesses, residential properties and other key stakeholders (eg schools, local councils) affected by the activity will be notified at least five business days prior to commencement of the activity.	Contractor / Transport	Pre-construction / construction	Enabling work / main construction work	Standard safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
GEN3	General – environmental awareness	<p>All personnel working on site will receive training to ensure awareness of environment protection requirements to be implemented during the project. This will include up-front site induction and regular "toolbox" style briefings.</p> <p>Site-specific training will be provided to personnel engaged in activities or areas of higher risk. These include:</p> <ul style="list-style-type: none"> • areas of Aboriginal heritage sensitivity and known Aboriginal sites • non-Aboriginal heritage site locations • threatened species habitat, Biobank site location and 'no-go' zones • locations of potential asbestos • areas where work is proposed within or very close to South Creek • areas very close to sensitive receivers, such as when constructing the noise wall along the eastern side. 	Contractor	Pre-construction / construction	Enabling work / main construction work	Standard safeguard
B1	Biodiversity	<p>A Flora and Fauna Management Plan will be prepared in accordance with Transport's <i>Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects</i> (RMS, 2011) and implemented as part of the CEMP. Refer to Section 8.1 of the BDAR (Appendix D) for the individual guideline reference numbers. It will include, but not be limited to:</p> <ul style="list-style-type: none"> • plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas • requirements set out in the <i>Landscape Design Guideline</i> (RMS, 2018) • pre-clearing survey requirements by suitably qualified ecologists • procedures and requirements for vegetation and habitat removal • procedures for unexpected threatened species finds and fauna handling • procedures addressing relevant matters specified in the Policy and guidelines for fish habitat conservation and management (DPI Fisheries, 2013) • procedures for native vegetation rehabilitation and re-establishment in consideration of the urban design concept • procedures for educating construction staff on how to implement controls to avoid or minimise potential environmental impacts • protocols to manage weeds and pathogens. 	Transport / Contractor	Detailed design / pre-construction / construction	Enabling work / main construction work	Section 4.8 of QA G36 <i>Environment Protection</i>

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
B2	Biodiversity	Measures to further avoid and minimise native vegetation or habitat removal and fragmentation of vegetation (particularly in areas of TECs) will be investigated during detailed design and implemented where practicable and feasible. The limit of clearing will be confirmed in a revised vegetation clearance boundary, within which construction work would not be permitted to occur.	Transport	Detailed design	N/A	Standard safeguard
B3	Shading and artificial light	Shading and artificial light impacts will be minimised where practicable, particularly adjacent to the BA408 Luddenham BioBank site, taking into account minimum luminescence requirements for: <ul style="list-style-type: none"> safety when constructing during the night-time period an urban road as outlined in the Australian Standards. 	Transport / Contractor	Detailed design/ construction	N/A	Additional safeguard
B4	Impacts to habitat in human made structures	Where microbats are present and impacted within a structure, a Microbat Management Plan is to be developed by a suitably qualified microbat expert in consultation with Transport Biodiversity Officer. The Microbat Management Plan would be incorporated into the Flora and Fauna Management Plan. As a minimum, the plan is to include: <ul style="list-style-type: none"> demonstrated consideration of the roosting and breeding season requirements of the target species pre-clearing requirements for artificial habitat during pre-construction a detailed methodology for pre-clearing surveys to identify microbats within the bridge structure a protocol for identification, capture, and relocation of microbats reporting requirements including species identification, number, relocation actions, exclusion methods a protocol to routinely review and update the plan. 	Contractor	Detailed design / construction	Enabling work / main construction work	Additional safeguard
B5	Aquatic impacts	Aquatic habitat will be protected in accordance with: <ul style="list-style-type: none"> <i>Guide 10: Aquatic habitats and riparian zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA Projects (RMS, 2011)</i> <i>Section 3.3.2 Standard precautions and mitigation measures of the Policy and guidelines for fish habitat conservation and management Update 2013 (Department of Primary Industries (Fisheries NSW), 2013).</i> <p>Culverts will be installed in accordance with the DPI (2013) guidelines.</p> <p>Implement and regularly maintain erosion and sediment controls for the duration of construction as per Landcom (2004), which will be detailed in a Soil and Water Management Plan.</p>	Transport / Contractor	Detailed design/ construction	Enabling work / main construction work	Additional safeguard

Transport
for NSW

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
B6	Unexpected biodiversity impacts	Fencing and/or the use of highly visible rope or tape boundaries will be used to delineate the boundary of vegetation clearing at the edge of the proposal area. Signposting will be used to inform project personnel and site visitors of areas of conservation value to restrict entry or inform behaviour that will reduce incidental interactions with fauna.	Contractor	Construction	Enabling work / main construction work	Additional safeguard
B7	Vehicle strike	Transport will monitor road kills along Mamre Road during operation to identify the need for any additional safeguards. The northern portion of the Luddenham BioBank site would require the existing fence to be removed to account for the proposal area. A replacement fence is to be installed at the northern portion of Luddenham BioBank site to assist in minimising fauna movement across Mamre Road.	Transport	Operation	N/A	Additional safeguard
B8	Invasion and spread of weeds	Weed species will be managed in accordance with <i>Guide 6: Weed management of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA 2011).	Contractor	Construction	Enabling work / main construction work	Additional safeguard
B9	Changes to hydrology	Changes to existing surface water flows will be minimised through detailed design.	Transport	Detailed design	N/A	Additional safeguard
B10	Potential impact on key fish habitat	Transport will continue consultation with DPI Fisheries during detailed design to identify any additional measures required to minimise potential impacts to aquatic habitat within South Creek.	Transport	Detailed design	N/A	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
B11	Removal of threatened species habitat and habitat features	<p>Habitat removal minimised through detailed design.</p> <p>Develop and implement a Flora and Fauna Management Plan as part of the CEMP. Fauna will be managed in accordance with <i>Guide 9: Fauna handling of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA, 2011).</p> <p>Habitat removal will be undertaken in accordance with <i>Guide 4: Clearing of vegetation and removal of bushrock of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA, 2011).</p> <p>Habitat will be replaced or re-instated in accordance with <i>Guide 5: Re-use of woody debris and bushrock</i> and <i>Guide 8: Nest boxes of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA, 2011).</p> <p>Vegetation removal would occur in accordance with <i>Vegetation Management (Protection and Removal) Guideline</i> (Transport, 2021b).</p> <p>The unexpected species find procedure is to be followed under <i>Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA, 2011) if threatened fauna, not assessed in the biodiversity assessment, are identified in the proposal site.</p> <p>The need for nesting boxes or artificial hollows to be installed as part of the proposal to provide alternate habitat for birds and marsupials, and whether these are feasible to be implemented, will be considered further during detailed design.</p>	Transport / Contractor	Detailed design / Construction	Enabling work / main construction work	Additional safeguard
B12	Potential disturbance of termites	<p>An investigation will be carried out prior to the commencement of clearing and grubbing to confirm the potential for termites in the trees along Mamre Road that may be directly affected by construction of the proposal.</p> <p>If termites are identified during the inspection, affected trees that will be directly impacted by the proposal will be treated to minimise the potential for termites to impact surrounding properties as a result of disturbance due to the proposal.</p>	Transport / Contractor	Pre-construction / construction	Enabling work / main construction work	Additional safeguard
B13	Biodiversity offsets	The proposal's biodiversity offset obligation for impacts on biodiversity values using the BAM-C will be recalculated prior to construction if any further amendments to the vegetation clearance boundary are proposed.	Transport	Pre-construction	N/A	Additional safeguard
B14	Tree risk	A preliminary tree assessment, Arborist Impact Assessment and tree risk assessment will be carried out for all existing trees prior to removal of vegetation to identify any specific concerns regarding the options to retain or remove vegetation.	Contractor	Detailed design / pre-construction	N/A	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
B15	Maintenance of culverts for fauna connectivity	Culverts within the proposal area will be regularly maintained and cleared (including weed control in adjacent native vegetation) to maintain potential use of these structures for fauna connectivity.	Transport	Operation	N/A	Additional safeguard
B16	Impact on BioBank site	Compensation will be provided to the Biodiversity Conservation Trust and the Office of Strategic Lands as required for impacts to existing biodiversity offset credits generated within the Luddenham Road BioBank site.	Transport	Pre-construction	N/A	Additional safeguard
B17	Staged retirement of biodiversity offset credits	Biodiversity credits will be retired prior to construction or the stage of the construction activity that would impact on biodiversity values.	Transport	Pre-construction	N/A	Additional safeguard
AH1	Aboriginal heritage	The design and construction methodology for the proposal will be reviewed during detailed design to identify any further areas where direct impacts on Aboriginal sites could be avoided or minimised.	Transport	Detailed design	N/A	Additional safeguard
AH2	Aboriginal heritage	An Aboriginal Heritage Impact Permit (AHIP) will be sought under section 90A of the NPW Act for Aboriginal sites with expected direct impacts (excluding the area within the boundary of existing AHIP C0002113) prior to construction. This is likely to include (subject to design refinement): <ul style="list-style-type: none"> Mamre Road 1 (AHIMS 45-5-3167) Mamre Road AFT 1 (AHIMS 45-5-5337) Mamre Road AFT 2 (AHIMS 45-5-5336) Mamre Road AFT 3 (AHIMS 45-5-5335) Mamre Road AFT 4 (AHIMS 45-5-5489) Mamre Road AFT 5 (AHIMS 45-5-5490) Mamre Road IF 1 (AHIMS 45-5-5338) MWP-AD5/MWP-AD6 (AHIMS 45-5-4815/45-5-4813). 	Transport	Detailed design / pre-construction	N/A	Additional safeguard
AH3	Mamre Road 1 and Mamre Road IF 1	Mamre Road 1 and Mamre Road IF 1 will be subject to community collection prior to any construction that may impact these sites. Community collection activities will be undertaken in accordance with the methodology attached as Appendix D in the <i>Aboriginal cultural heritage assessment report</i> (KNC, 2021b).	Transport	Detailed design / pre-construction / construction	Enabling work / main construction work	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
AH4	Salvage excavation	<p>Salvage excavations will be undertaken on the impacted portions of the following sites prior to construction works that would impact these sites:</p> <ul style="list-style-type: none"> • Mamre Road AFT 1 • Mamre Road AFT 2 • Mamre Road AFT 3 • Mamre Road AFT 4 • Mamre Road AFT 5 • MWP-AD5/MWP-AD6 <p>Salvage excavation activities will be undertaken in accordance with the methodology attached as Appendix D in the <i>Aboriginal cultural heritage assessment report</i> (KNC, 2021b).</p>	Transport	Pre-construction / construction	Enabling work / main construction work	Additional safeguard
AH5	Aboriginal heritage	<p>Short-term management of collected Aboriginal objects:</p> <ul style="list-style-type: none"> • Any Aboriginal objects that are removed from the land by actions authorised by an AHIP, would be moved as soon as practicable to the temporary storage location (Kelleher Nightingale Consulting Pty Ltd, Level 10, 25 Bligh Street, Sydney NSW 2000) pending any agreement reached about the long-term management of the Aboriginal objects. • Any Aboriginal objects stored at the temporary storage location would not be further harmed, except in accordance with the conditions of the AHIP. 	Transport	Pre-construction / construction	Enabling work / main construction work	Additional safeguard
AH6	Aboriginal heritage	<p>The long-term management of collected Aboriginal objects would occur as follows:</p> <ul style="list-style-type: none"> • Recovered objects would be lodged with the Australian Museum in the first instance in accordance with the <i>Australian Museum Archaeological Collection Deposition Policy</i> (Australian Museum, 2012) • If required, a variation would be sought for recovered objects to be held by the Aboriginal community or reburied. If reburial is to take place, registered Aboriginal stakeholders would be notified and given the opportunity to attend. • Requirement 26 "Stone artefact deposition and storage" in the <i>Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW</i> would be complied with. 	Transport	Construction	Enabling work / main construction work	Additional safeguard
AH7	Aboriginal heritage	<p>An Aboriginal Heritage Management Plan (AHMP) will be prepared in accordance with the <i>Procedure for Aboriginal cultural heritage consultation and investigation</i> (Transport, 2012) and <i>Standard Management Procedure - Unexpected Heritage Items</i> (Transport, 2015) and implemented as part of the CEMP. It will provide specific guidance on measures and controls to be implemented for managing impacts on Aboriginal heritage. The AHMP will be prepared in consultation with all relevant Aboriginal groups.</p>	Contractor	Detailed design / pre-construction / construction	Enabling work / main construction work	Section 4.9 of QA G36 <i>Environment Protection</i>

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
AH8	Aboriginal heritage	<i>The Standard Management Procedure - Unexpected Heritage Items</i> (Transport, 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Transport does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Construction	Enabling work / main construction work	Section 4.9 of QA G36 <i>Environment Protection</i>
AH9	Aboriginal heritage	Barrier fencing will be established on the AHIP boundary, where feasible, to make sure that no construction impact extends into areas of Aboriginal sites outside the AHIP boundary including: <ul style="list-style-type: none"> • Mamre Road AFT 1 • Mamre Road AFT 3 • Mamre Road AFT 4 • Mamre Road AFT 5 • MWP-AD7 • MWP-AD8 • MWP-IF1. Aboriginal sites outside of the AHIP boundary will be marked as environmentally sensitive “no-go zones” within the CEMP.	Contractor	Pre-construction / construction	Enabling work / main construction work	Additional safeguard
AH10	Aboriginal heritage	Workers will be inducted on appropriate protection measures for Aboriginal heritage and to comply with conditions in the AHIP.	Contractor	Construction	Enabling work / main construction work	Additional safeguard
AH11	Aboriginal heritage	The proposed works overlap an area that has been previously assessed for Aboriginal cultural heritage values and is already covered under an existing Aboriginal heritage impact permit (AHIP C00002113). As Transport is the holder for AHIP C00002113, any works related to the proposal undertaken within the boundary of AHIP C00002113 would need to comply with the existing permit conditions.	Transport	Construction	Main construction work	Additional safeguard
NAH1	Non-Aboriginal heritage	A Non-Aboriginal Heritage Management Plan (NAHMP) would be prepared and implemented as part of the CEMP. It would provide specific guidance on measures and controls to be implemented to avoid and mitigate impacts to non-Aboriginal heritage including but not limited to the following: <ul style="list-style-type: none"> • a map identifying locations of no-go areas, including listed item curtilages, which are to be avoided • identification of potential environmental risks/impacts due to the works/activities • site inductions and heritage awareness training 	Contractor	Detailed design / pre-construction / construction	Enabling work / main construction work	Section 4.10 of QA G36 <i>Environment Protection</i>

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
		<ul style="list-style-type: none"> management measures to avoid or minimise potential impacts outline of the content to be included in toolbox talks regarding management of non-Aboriginal heritage, including identification of no-go areas, any relevant permits and any responsibilities specified under the <i>Heritage Act 1977</i>. 				
NAH2	Non-Aboriginal heritage	<p><i>The Standard Management Procedure - Unexpected Heritage Items</i> (Transport, 2015) would be followed if any unexpected heritage items, archaeological remains or potential relics of non-Aboriginal origin are encountered.</p> <p>Work would only re-commence once the requirements of that Procedure have been satisfied.</p>	Contractor	Construction	Enabling work / main construction work	Section 4.10 of QA G36 <i>Environment Protection</i>
NAH3	Mamre House	<p>Mamre House, including significant gardens and grounds, would be protected throughout construction. Mitigation measures would include:</p> <ul style="list-style-type: none"> cordoning off the Mamre House building and other significant buildings and gardens, and defining these as a 'no works' zone to minimise impacts on the site and avoid any inadvertent damage to the property and significant grounds work completed within the SHR curtilage of the site would be carried out in accordance with the relevant conservation policies included within the Mamre House CMP (Section 6). 	Contractor	Construction	Enabling work / main construction work	Additional safeguard
NAH4	Marsden Memorial Cairn	<p>Retain and conserve the Marsden Memorial Cairn in an appropriate location within the SHR curtilage of Mamre House adjacent to the new driveway.</p> <p>Minimise through design and detailing any impacts on its setting and visibility from Mamre Road.</p>	Contractor	Detailed design / construction	Main construction work	Additional safeguard
NAH5	Mamre House driveway	A landscape solution for the redundant gated entrance and signage to Mamre Homestead off Mamre Road would be informed by specialist heritage advice and consider the significant pastoral setting and the heritage significance of the property beyond, and might include but not be limited to updated signage, an interpretation node for vehicles, and lighting.	Contractor	Detailed design	N/A	Additional safeguard
NAH6	Heritage interpretation opportunities	<p>Post-contact and contemporary Aboriginal cultural heritage values interpretation opportunities would be considered through the proposal area, including locations such as:</p> <ul style="list-style-type: none"> the Mamre House grounds as part of the new driveway landscape treatment along new pedestrian pathways and portals on the St Clair side of the proposal area noise walls proposed along the length of the proposal area. near a scar tree identified near the Blaxland Memorial Cairn. 	Contractor	Detailed design	N/A	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
NAH7	Non-Aboriginal heritage – archival recording	Undertake an external photographic archival recording of Mamre House, focusing on driveway changes and realignment as well as changes to the setting of the Memorial Cairn. The archival recording documentation is to be provided to Penrith City Council for their records.	Contractor / Transport	Detailed design / pre-construction	N/A	Additional safeguard
NAH8	Non-Aboriginal heritage	The urban design plan will be updated to guarantee that the significant rural view on Mamre House remains unaltered. Consultation with Heritage NSW regarding the proposed design change is required.	Contractor/ Transport	Detailed design/pre construction	N/A	Additional safeguard
TT1	Traffic and transport	<p>A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Transport <i>Traffic Control at Work Sites Manual</i> (RTA, 2010) and <i>QA Specification G10 Control of Traffic</i> (Transport, 2008). The TMP will include:</p> <ul style="list-style-type: none"> confirmation of haulage routes measures to maintain access to local roads and properties construction traffic control plans outlining site specific traffic control measures (including signage) to manage and regulate traffic movement measures to maintain pedestrian and cyclist access requirements and methods to consult and inform the local community of impacts on the local road network access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads. a response plan for any construction traffic incident consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic monitoring, review and amendment mechanisms. 	Contractor	Detailed design / pre-construction / construction	Enabling work / main construction work	Section 4.8 of QA G36 <i>Environment Protection</i>
TT2	Construction site access	<p>Construction site access will be designed and implemented in consideration of:</p> <ul style="list-style-type: none"> road design guidelines and turning paths for heavy vehicles appropriate sight distances and deceleration/acceleration lanes (where required near highly trafficked areas) to allow traffic to safely enter and exit conspicuous temporary regulatory, warning and guide signs use of accredited traffic controllers, where appropriate and/or other controls to separate, slow down or temporarily stop traffic for safe entry/exit minimising use of local roads, where practical 	Contractor	Detailed design / pre-construction / construction	Main construction work	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
		<ul style="list-style-type: none"> minimising the size of heavy vehicles that would use local roads to access construction zones safe arrangements for pedestrians and/or cyclists. 				
TT3	Temporary traffic arrangement	<p>The temporary traffic arrangement for Mamre Road will be designed to provide at a minimum, where feasible and reasonable:</p> <ul style="list-style-type: none"> single through lane per direction maintain traffic movements at intersections lanes widths of at least 3.5m 0.5m shoulder. <p>The posted speed limit is also proposed to be reduced from 80 kilometres per hour to 60 kilometres per hour along Mamre Road during construction.</p>	Contractor	Detailed design / construction	Main construction work	Additional safeguard
TT4	Traffic impacts	Further traffic modelling will be carried out during detailed design following confirmation of the construction methodology and traffic staging to confirm the potential for traffic impacts and identify whether any additional mitigation measures or traffic control measures would be required.	Contractor	Detailed design	N/A	Additional safeguard
TT5	Impact on bus stops or routes	If any potential direct impacts on bus stops or routes during construction are identified, Transport will consult with the relevant bus operator/s to identify alternate arrangements.	Transport	Pre-construction / construction	Main construction work	Additional safeguard
TT6	Damage to local roads	<p>A Road Dilapidation Report will be prepared by a suitably qualified person for local roads proposed to be used by heavy vehicles, before the commencement of use of the roads during construction.</p> <p>Any damage to the local road network identified to be caused by construction vehicles for the proposal will be remediated rectified by the contractor to be similar to the existing road condition.</p>	Transport / Contractor	Pre-construction / post-construction	N/A	Additional safeguard
TT7	Impacts on cycling	<p>During detailed design, a cyclist detour strategy would be prepared and implemented during construction to minimise any temporary impacts on cycling during construction.</p> <p>Community consultation will be carried out to understand the travel patterns of cyclists and inform the cyclists of any alternate access arrangements.</p>	Transport / Contractor	Detailed design / pre-construction / construction	Main construction work	Additional safeguard
TT8	Temporary access changes	Detours during temporary access changes will be implemented with directional signage along alternate routes, including advice to pedestrians and cyclists of any path closures.	Contractor	Construction	Enabling work / main construction work	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
TT9	Traffic management measures	Any temporary traffic diversions, clearways and road closures will be implemented in accordance with Transport Management Centre (TMC) requirements.	Contractor	Construction	Enabling work / main construction work	Additional safeguard
TT10	Property access	Property access will be maintained where feasible and reasonable and property owners (including Erskine Park Rural Fire Service and Mamre House) will be consulted before starting any work that may restrict or control access. <u>Where temporary access impacts would occur due to construction of the relocated parking to the Erskine Park Rural Fire Service, and driveway adjustment at the KFC fast food restaurant, consultation with the landholders would occur prior to works.</u>	Contractor	Pre-construction / construction	Enabling work / main construction work	Additional safeguard
TT11	Local road or shared path closures	Council will be consulted with prior to any local road or shared path closures to identify suitable mitigation measures such as detour routes.	Contractor	Construction	Enabling work / main construction work	Additional safeguard
TT12	Parking	Off-road parking for construction vehicles will be provided within the compound sites and construction areas.	Contractor	Pre-construction / construction	Enabling work / main construction work	Additional safeguard
TT13	Sensitivity analysis of traffic assumptions	A sensitivity analysis will be carried out to understand the influence of the Southern Link Road construction on the expected traffic performance of the proposal.	Transport	Detailed design	N/A	Additional safeguard
TT14	Temporary traffic arrangement	The potential traffic impacts of any temporary arrangement along Mamre Road associated with revised construction staging of the proposal will be assessed during detailed design to identify any additional mitigation measures required.	Transport	Detailed design	N/A	Additional safeguard
HF1	Flood risk	Flood modelling will be carried out to confirm flood impacts during detailed design including consideration of the potential noise wall on PMF flood risk.	Transport	Detailed design	N/A	Additional safeguard
HF2	Flood risk	Conduct an allotment and floor level survey of 43 and 44 McIntyre Avenue, St Clair to confirm flood inundation risk for these properties.	Transport	Detailed design	N/A	Additional safeguard
HF3	Scour risk	The detailed design will consider the need to provide scour protection and energy dissipation measures to mitigate the localised increases in flow velocities at the outlets that are to be upgraded, relocated or new stormwater drainage systems.	Transport	Detailed design	N/A	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
HF4	Flooding	<p>Further consideration of measures to minimise flooding impacts on the compound sites and construction activities will be undertaken during detailed design. This will include identification of:</p> <ul style="list-style-type: none"> • areas where material storage and stockpiles could be located outside of land subject to flooding in a 20 year ARI flood event • feasible design measures or construction methods to minimise sedimentation and cross contamination risks where flood prone land cannot be avoided for material storage and stockpiles such as installing erosion and sediment controls around compound site boundaries. 	Transport / Contractor	Detailed design	N/A	Additional safeguard
HF5	Hydrology impacts	The detailed design of any temporary waterway crossings will be developed in consultation with the Transport Environmental Officer and include appropriate pipe outlets, scour protection and flood immunity to minimise impacts on hydrology and flooding.	Transport	Detailed design	N/A	Additional safeguard
HF6	Hydrology impacts	All work within waterways will be carried out in accordance with the <i>Code of practice for minor work in NSW waterways</i> (Roads and Maritime, 2014a).	Contractor	Construction	Enabling work / main construction work	Additional safeguard
HF7	Flooding	<p>The CEMP will include a Construction Flood Management Plan, which will include details and procedures to minimise the potential for construction activities to adversely impact on flood behaviour.</p> <p>This Plan will define the flood immunity criteria (including consideration of inundation from minor rain events) for material storage and stockpile areas proposed to be located on land that is inundated during a 1% AEP event.</p> <p>Measures to manage residual flood impacts that will be outlined in the Plan will include:</p> <ul style="list-style-type: none"> • staging construction to limit the extent and duration of temporary works on the floodplain • ensuring construction equipment and materials are removed from floodplain areas at the completion of each work activity or should a weather warning be issued of impending flood producing rain • providing temporary flood protection to properties identified as being at risk of adverse flood impacts during any stage of construction of the proposal, where feasible and reasonable • limiting the extent of works located in floodway areas • monitoring weather conditions (existing and forecast conditions), including minor rain events, local weather warnings and river water level data 	Transport / Contractor	Detailed design / pre-construction / construction	Enabling work / main construction work	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
		<ul style="list-style-type: none"> a communication protocol to disseminate warnings to construction personnel of impending flood producing rain or predicted flooding and actions required to make construction areas stable and safe implementation of a flood evacuation plan. 				
HF8	Flooding	<p>A flood evacuation plan for construction personnel, materials and equipment will be prepared to manage a potential flood event during construction and included as part of the CEMP. This plan will be implemented during construction and outline:</p> <ul style="list-style-type: none"> procedures to monitor rainfall that may influence water levels what flood event would trigger the plan evacuation procedures including a map indicating the area that is flood prone and suitable evacuation locations procedures to reduce risk during a flood event including removal of all plant/equipment and stabilising exposed areas. 	Contractor	Pre-construction / construction	Enabling work / main construction work	Additional safeguard
HF9	Flooding	<p>The storage of hazardous material will be confined to areas that are not subject to flooding during a one per cent AEP extent or either:</p> <ul style="list-style-type: none"> stored in a manner that prevents their mobilisation during times of flood be removed from the floodplain when minor rain events are predicted to inundate storage areas and at the onset of a flood. 	Contractor	Construction	Enabling work / main construction work	Additional safeguard
SW1	Soil and water	<p>A Soil and Water Management Plan (SWMP) will be prepared and implemented as part of the CEMP to manage water quality impacts during construction of the proposal. The SWMP will identify all reasonably foreseeable risks relating to soil erosion and sedimentation, dewatering and water pollution and describe how these risks will be addressed during construction.</p> <p>The SWMP will be reviewed by a soil conservationist on the Transport list of Registered Contractors for Erosion, Sedimentation and Soil Conservation Consultancy Services. The SWMP will then be revised to address the outcomes of the review.</p>	Contractor	Detailed design / pre-construction / construction	Enabling work / main construction work	Section 2.1 of <i>QA G38 Soil and Water Management</i>
SW2	Soil and water	<p>A site-specific Erosion and Sediment Control Plan/s (ESCP) will be prepared and implemented as part of the SWMP.</p> <p>The Plan will include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather.</p>	Contractor	Detailed design / pre-construction / construction	Enabling work / main construction work	Section 2.2 of <i>QA G38 Soil and Water Management</i>

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
SW3	Soil and water	A construction water quality monitoring plan will be prepared and implemented as part of the SWMP. The plan will be prepared in accordance with the Transport Guideline for Construction Water Quality and EPA publication "Approved Methods for the Sampling and Analysis of Water Pollutants in NSW.	Contractor	Detailed design / pre-construction / construction	Enabling work / main construction work	Additional safeguard
SW4	Soil and water	The design and construction of watercourse crossings, works within a watercourse or works on waterfront land as defined by the <i>Water Management Act 2000</i> are to be undertaken with consideration to the <i>Guidelines for instream works on waterfront land</i> (DPI, 2012a), <i>Guidelines for watercourse crossings on waterfront land</i> , (DPI, 2012b) and in accordance with relevant Transport specifications and guidelines.	Transport / Contractor	Detailed design / construction	Enabling work / main construction work	Additional safeguard
SW5	Contaminated land	A Contaminated Land Management Plan will be prepared in accordance with the <i>Guideline for the Management of Contamination</i> (Transport, 2013) and implemented as part of the CEMP. The plan will include, but not be limited to: <ul style="list-style-type: none"> capture and management of any surface runoff contaminated by exposure to the contaminated land further investigations required to determine the extent, concentration and type of contamination, as identified in the detailed site investigation (Phase 2) management of the remediation and subsequent validation of the contaminated land, including any certification required measures to ensure the safety of site personnel and local communities during construction. 	Contractor	Detailed design / pre-construction / construction	Enabling work / main construction work	Section 4.2 of QA G36 <i>Environment Protection</i>
SW6	Contaminated land	A Remediation Action Plan (RAP) and an Unexpected Find Protocol (UFP) will be prepared and implemented to manage the potential for soil or water quality contamination during construction of the proposal. The RAP will evaluate potential remedial options and recommend a preferred option to manage the ACM during the construction of the road upgrades. The RAP should include a Long-Term Environmental Management Plan for the ACM material (should it remain in the proposal alignment). The RAP should include a preliminary plan to manage potential risks to human health and the environment during the remediation activities. The RAP will form a part of the overall CEMP.	Contractor	Detailed design / pre-construction / construction	Enabling work / main construction work	Additional safeguard
SW7	Asbestos	When working in areas impacted by asbestos, Work Health and Safety (WHS) and additional controls must be in place to minimise exposure risks. These may include physical removal of asbestos fragments from the soil surface, additional dust suppression and appropriate PPE.	Contractor	Construction	Enabling work / main construction work	Additional safeguard
SW8	Asbestos	Asbestos air monitoring by a licensed hygienist/LAA should be carried out for the duration of the earthworks to monitor for respirable asbestos fibres which may be released.	Contractor	Construction	Enabling work / main construction work	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
SW9	Accidental spill	A site-specific emergency spill plan will be developed and include spill and leak management measures in accordance with the <i>Transport Code of Practice for Water Management</i> (RTA, 1999) and relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Transport and EPA officers).	Contractor	Pre-construction / construction	Enabling work / main construction work	Section 4.3 of QA G36 <i>Environment Protection</i>
SW10	Accidental spill	Spill containment to be provided within operational water quality basins located within road catchments considered to present a high risk to South Creek.	Contractor	Detailed design_ / pre-construction / construction	N/A	Additional safeguard
SW11	Stormwater	The layout and detail of the drainage system including drainage, water quality basins, spill containment, swales, discharge points and outlet scour protection measures will be refined during detailed design. This should consider any recent work in South Creek that may influence stormwater flow and management. _	Transport	Detailed design	N/A	Additional safeguard
SW12	Stormwater	Stormwater outlets to local drainage lines and waterways are to be designed with consideration to the <i>Guidelines for outlet structures on waterfront land</i> (DPI, 2012c) and relevant Transport specifications and guidelines. This will include consideration of vegetated channels with plants suitable for 1V:2H batter slopes that do not require mowing and short lengths of linear biofiltration where possible during detailed design.	Transport	Detailed design	N/A	Additional safeguard
SW13	Stockpiles	Stockpiles sites will be managed in accordance with <i>Environmental Procedure Management of Wastes on Roads and Maritime Services Land</i> (RMS, 2014b)	Contractor	Construction	Enabling work / main construction work	Additional safeguard
SW14	Soil and water	Stockpiles site locations would be confirmed during detailed design and managed during construction in accordance with <i>Environmental Procedure Management of Wastes on Roads and Maritime Services Land</i> (RMS, 2014b) and the <i>Stockpile Site Management Guideline</i> (RMS, 2015b). This would consider measures to manage cross contamination within a stockpile area.	Contractor	Detailed design / construction	Enabling work / main construction work	Additional safeguard
SW15	Soil and water	Further consideration of how to manage stockpiles, material laydown and chemical storage with respect to floodwater would be undertaken during detailed design.	Contractor	Detailed design / pre-construction	N/A	Additional safeguard
SW16	Soil and water	An assessment of the impact of discharges from each temporary sediment basin would be undertaken during detailed design in accordance with the <i>Draft Guideline for Assessing the Impacts of Treated Water Discharge from Water Quality Treatment Controls</i> (Transport 2020b). The assessment would adopt relevant water quality objectives for South Creek and include a catchment analysis to confirm the flow characteristics of the receiving waterways.	Transport / Contractor	Detailed design / pre-construction	N/A	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
NV1	Noise and vibration	<p>A Construction Noise and Vibration Management Plan (CNVMP) will be prepared and implemented as part of the CEMP. The CNVMP will generally follow the approach in the <i>Interim Construction Noise Guideline (ICNG)</i> (DECC, 2009) and identify:</p> <ul style="list-style-type: none"> • nearby sensitive receivers • all potential significant noise and vibration generating activities associated with the activity • description of works, construction equipment and hours work would be completed in • results of location- and activity-specific noise and vibration impact assessments • feasible and reasonable mitigation measures to be implemented, taking into account <i>Beyond the Pavement: urban design policy, process and principles</i> (Transport, 2020a) • criteria for the proposal and relevant licence and approval conditions • a monitoring program to assess performance against relevant noise and vibration criteria • contingency measures to be implemented in the event of non-compliance with noise and vibration criteria • arrangements and details for consultation with the community, affected neighbours and sensitive receivers, including notification and complaint handling procedures • details on how respite would be applied where ongoing high impacts are seen at certain receivers. 	Contractor	Detailed design / construction	Enabling work / main construction work	Section 4.6 of QA G36 <i>Environment Protection</i>
NV2	Noise and vibration	<p>All sensitive receivers (e.g. schools, local residents) likely to be affected will be notified at least seven days prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of:</p> <ul style="list-style-type: none"> • the project • the construction period and construction hours • contact information for project management staff • complaint and incident reporting • how to obtain further information. 	Contractor	Detailed design / pre-construction / construction	Enabling work / main construction work	Standard safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
NV3	Noise and vibration	<p>Location- and activity-specific noise and vibration impact assessments should be carried out, as a minimum, prior to activities:</p> <ul style="list-style-type: none"> with the potential to result in noise levels above 75 dBA at any receiver required outside Standard Construction Hours likely to result in noise levels in greater than the relevant NMLs with the potential to exceed relevant criteria for vibration. <p>The assessments should confirm the predicted impacts at the relevant receivers in the vicinity of the activities to aid the selection of appropriate management measures, consistent with the requirements of the CNVG. The results of these assessments will be included as part of the CNVMP.</p>	Contractor	Pre-construction / construction	Enabling work / main construction work	Additional safeguard
NV4	Noise and vibration	Monitoring should be carried out at the start of noise intensive activities to confirm that actual levels are consistent with the predictions and that appropriate mitigation measures from the CNVG have been implemented.	Contractor	Construction	Enabling work / main construction work	Additional safeguard
NV5	Noise	<p>Where noise intensive equipment is to be used near sensitive receivers, the work should be scheduled for Standard Construction Hours, where possible. If it is not possible to restrict the work to the daytime, then they should be completed as early as possible in each work shift.</p> <p>Appropriate respite should also be provided to affected receivers in accordance with the CNVG.</p>	Contractor	Pre-construction / construction	Enabling work / main construction work	Additional safeguard
NV6	Noise	Hoarding, or other shielding structures, should be considered for use where receivers are impacted near compounds or fixed work areas with long durations. To provide effective noise mitigation, the barriers should break line-of-sight from the nearest receivers to the work and be of solid construction with minimal gaps.	Contractor	Pre-construction / construction	Enabling work / main construction work	Additional safeguard
NV7	Vibration	<p>The potential for vibration impacts and requirement for vibration intensive work and equipment will be reviewed during detailed design.</p> <p>Where work is within the minimum working distances and considered likely to exceed the cosmetic damage criteria:</p> <ul style="list-style-type: none"> Different construction methods with lower source vibration levels will be investigated and implemented, where feasible Attended vibration measurements will be undertaken at the start of the work to determine actual vibration levels at the item. Work should be ceased if the monitoring indicates vibration levels are likely to, or do, exceed the relevant criteria. 	Contractor	Detailed design / pre-construction / construction	Enabling work / main construction work	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
NV8	Vibration	Building condition surveys should be completed before and after the work where buildings or structures are within the minimum working distances and considered likely to exceed the cosmetic damage criteria during the use of vibration intensive equipment.	Contractor	Detailed design / pre-construction / construction	Enabling work / main construction work	Additional safeguard
NV9	Operational noise mitigation	Operational noise mitigation requirements including the noise wall design and any at-property treatments will be reviewed during detailed design. At-property treatments will be agreed upon and implemented during construction, where feasible and reasonable, in consultation with property owners. Timing of noise wall construction will also be reviewed during detailed design with an aim to build noise walls as early as possible during the construction phase.	Transport / Contractor	Detailed design	N/A	Additional safeguard
NV10	Noise from temporary detours	The proposal should review the requirement for detours during preparation of the CNVMP when sufficient information is available to allow the potential noise impacts to be determined.	Transport	Detailed design / pre-construction	N/A	Additional safeguard
NV11	Vibration	The proposal will consider the risk of unstable soils where vibration impacts would be experienced during detailed design. Additional geotechnical investigations will also be carried out during detailed design to confirm the ground condition within and near the proposal area.	Transport	Detailed design	N/A	Additional safeguard
LV1	Landscape character and visual impact	The Urban Design Concept will continue to be developed to support the final detailed project design and implemented as part of the CEMP. It would be prepared in accordance with relevant guidelines, including: <ul style="list-style-type: none"> • <i>Beyond the Pavement urban design policy, process and principles</i> (Transport, 2020a) • <i>Noise Wall Design Guidelines</i> (Transport, 2021) • <i>Landscape Design Guideline</i> (RMS, 2018). 	Contractor / Transport	Detailed design / pre-construction / construction	Enabling work / main construction work	Standard safeguard
LV2	Road furniture	Consolidate signage structures and minimise visual clutter and obstructions, particularly in front of Mamre House.	Contractor	Detailed design	N/A	Additional safeguard
LV3	Planting	The landscape plan for the proposal will be confirmed during detailed design and would consider: <ul style="list-style-type: none"> • arranging plants to maintain the long vistas to the Blue Mountains and views to Mamre House and other heritage sites • choosing a variety of species for feature planting that is generally reflective of the existing landscape character and prioritises native vegetation, including consideration of tree sizes balancing long term performance with initial presentation 	Transport	Detailed design	N/A	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
		<ul style="list-style-type: none"> • selection of plant species and layouts in riparian areas and near culverts in consultation with ecologists • planting in the median strip where it is more than three metres wide • planting to provide screening and shade, particularly along the proposed shared path • maintaining existing roadside vegetation, where possible • planting tubestock for site revegetation with consideration of native species (such as members of Cumberland Plain Woodland, River-Flat Eucalypt Forest and Swamp Oak Floodplain Forest TECs), where practical and available at the time of planting • measures to minimise urban heat, including provision of surface water and soil moisture, permeable and grassed ground cover and tree cover • landscape design and species selection to mitigate aviation risk for the Western Sydney Airport informed by discussions with the M12 Motorway project team • consideration of planting in lieu of seeding on 4:1 batters to avoid maintenance complications 				
LV4	Noise walls, bus stops and pedestrian portals	<p>The detailed design of the noise walls, bus stops and pedestrian portals will consider:</p> <ul style="list-style-type: none"> • reflecting the distinctive landscape character zones along the road corridor through colour, art and texture • opportunities for heritage interpretation at key locations • way-finding opportunities at pedestrian portals • pedestrian and cyclist safety, including lighting and using CPTED principles • shading impacts of the noise wall through an updated shading assessment • colour selection informed by an access/disability consultant to help users visibly identify their stop or access point. 	Transport	Detailed design	N/A	Additional safeguard
LV5	Construction light spill	Lighting of construction areas (if required) would be orientated to minimise glare and light spill impacts on nearby residences.	Contractor	Construction	Enabling work / main construction work	Additional safeguard
LV6	Overhead powerlines	The location of overhead powerlines and power poles would be confirmed during detailed design to minimise visual impacts on Mamre House, where possible.	Transport	Detailed design	N/A	Additional safeguard
LV7	Landscaping near asphalt verge	The detailed design will consider the potential for installation of jute netting at the interface between the asphalt shoulder and softer landscape surfaces to avoid scouring.	Transport	Detailed design	N/A	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
AQ1	Air quality	<p>An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to:</p> <ul style="list-style-type: none"> • potential sources of air pollution • air quality management objectives consistent with any relevant published EPA and/or OEH/DPIE (now DPE) guidelines • minimise the number of stockpiles onsite, avoid stockpiling in exposed areas and ensure long term stockpiles are covered or stabilised • emission and dust mitigation and suppression measures to be implemented • vehicles and mobile plant to use designated haulage and access routes and restrict traffic speeds on site • all vehicles transporting soils, rock or other materials are covered when entering or exiting the site • maintain all vehicles and plant in accordance with manufacturer specifications • methods to manage work during strong winds or other adverse weather conditions. Daily monitoring of weather forecasts to be undertaken to determine when adverse weather conditions are predicted. • a progressive rehabilitation strategy for exposed surfaces • daily visual observations of dust to identify construction activities, vehicles, plant or equipment that are generating excessive air emissions. Additional mitigation strategies to be implemented where necessary. 	Contractor	Detailed design / pre-construction / construction	Enabling work / main construction work	<p>Core standard safeguard AQ1</p> <p>Section 4.4 of QA G36 <i>Environment Protection</i></p>
AQ2	Air quality	Concrete batching plant to be located at least 200 metres (where feasible) from residences.	Contractor	Detailed design / construction	Main construction work	Additional safeguard
AQ3	Air quality	Transport will continue consulting with DPE (now the NSW Department of Climate Change, Energy, the Environment and Water) regarding the potential timing and impacts on the St Marys Monitoring station during the operation of compound site 2 and options to mitigate this impact.	Transport	Detailed design / pre-construction	N/A	Additional safeguard
AQ4	Potential odour	Any portable toilets established for use by construction workers for the proposal would be appropriately sited and maintained to minimise any offensive odours impacting nearby sensitive receivers.	Contractor	Construction	Main construction work	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
SE1	Socio-economic	<p>A Community and Stakeholder Engagement Plan (CSEP) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The CSEP will include (as a minimum):</p> <ul style="list-style-type: none"> mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions contact name and number for complaints. 	Contractor	Pre-construction / construction	Enabling work / main construction work	Standard safeguard
SE2	Impacts on nearby property owners and land occupiers	Transport will continue to consult with the community and affected property owners and land occupiers until the completion of the proposal. Discussions including the nature and timing of construction works would be required to identify relevant noise, traffic, air quality, access and visual impact mitigation measures for residents, stakeholders, and people using the proposal.	Transport	Pre-construction/ construction	Enabling work / main construction work	Additional safeguard
SE3	Property acquisition	<p>All property acquisition will be carried out in accordance with the <i>Land Acquisition Information Guide</i> (Transport, 2014b) and the <i>Land Acquisition (Just Terms Compensation) Act 1991</i>.</p> <p>Transport will continue to consult with Penrith City Council regarding council owned land and assets. The design for the proposal will also be refined during detailed design to minimise impacts on community land, where possible.</p>	Transport	Detailed design/ pre-construction	N/A	Standard safeguard
SE4	Changes in access	Temporary and permanent changes in access will be discussed with impacted land occupiers prior to commencement of construction and during construction activities should arrangements change.	Transport	Pre-construction / construction	Enabling work / main construction work	Additional safeguard
SE5	Business consultation	<p>Transport will consult with businesses about construction activities required for the proposal, including freight and industrial businesses that use Erskine Business Park.</p> <p>Measures to maintain access and visibility to businesses on Mamre Road during construction would be discussed and implemented.</p>	Transport / Contractor	Pre-construction/ construction	Main construction work	Additional safeguard
SE6	Social infrastructure	Transport will consult with facilities near the proposal including Banks Public School, Catholic Care Mamre House, Feathered Friends, Erskine Park Rural Fire Brigade, Old MacDonald Childcare Centre, Peter Kearns Memorial Oval and DOGS NSW regarding construction activities.	Transport / Contractor	Pre-construction/ construction	Enabling work / main construction work	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
SE7	Relocation of bus stops during construction	Public transport users will be notified in advance of any changes to bus stop locations or bus routes through signage at the existing bus stop. Temporary bus stops would have similar features to existing bus stops, including shelters and rest areas for less mobile and elderly people and adequate way finding signage. Consultation with the relevant bus authorities will be undertaken (including school buses) to mitigate potential impacts to bus routes and times.	Transport / Contractor	Pre-construction / construction	Main construction work	Additional safeguard
SE8	Traffic management for all road users	Alternative routes for active transport users will be clearly identified by signage and the use of traffic controllers where required. This includes signage located in areas close to Banks Drive and Bakers Lane where school children may be travelling to and from school.	Transport	Pre-construction / construction	Main construction work	Additional safeguard
SE9	Removal of parking	Penrith City Council will be consulted about the permanent removal of parking spaces on Solander Drive and McIntyre Avenue.	Transport	Detailed design	N/A	Additional safeguard
SE10	Tree root impacts on properties	Design solutions to minimise any potential impacts of the root systems of trees planted along Mamre Road on adjoining property will be confirmed during detailed design.	Transport	Detailed design	N/A	Additional safeguard
SE11	Council-owned assets	Transport will replace or reinstate any Council-owned assets impacted during construction.	Transport / Contractor	Detailed design / pre-construction / construction	Main construction work	Additional safeguard
O1	Resource use	The following resource management hierarchy principles would be followed: <ul style="list-style-type: none"> • avoid unnecessary resource consumption as a priority • avoidance would be followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery) • disposal would be undertaken as a last resort (in accordance with the <i>Waste Avoidance and Resource Recovery Act, 2001</i>). 	Contractor	Detailed design / pre-construction / construction	Enabling work / main construction work	Additional safeguard
O2	Energy consumption	Energy efficient LEDs would be considered for new streetlights installed as part of the proposal.	Transport	Detailed design	N/A	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
O3	Waste	<p>A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to:</p> <ul style="list-style-type: none"> measures to avoid and minimise waste associated with the project classification of wastes and management options (re-use, recycle, stockpile, disposal) statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions consideration of Sydney Waters' requirements for trade waste licence requests or discharge of chlorinated water procedures for storage, transport and disposal monitoring, record keeping and reporting. <p>The WMP will be prepared taking into account the <i>Environmental Procedure - Management of Wastes on Transport for NSW Land</i> (Transport, 2014) and relevant Transport Waste Fact Sheets.</p>	Contractor	Detailed design / pre-construction / construction	Enabling work / main construction work	Section 4.2 of QA G36 <i>Environment Protection</i>
O4	Waste	Additional soil samples will be required to meet a reasonable sampling density to classify any waste produced. Additional soil samples of natural soil material will also be required to meet the requirements of Excavated Natural Material under the Resource Recovery Order (RRO) / Resource Recovery Exemption (RRE).	Contractor	Pre-construction / construction	Enabling work / main construction work	Additional safeguard
O5	Waste	Records of waste classifications, waste disposal, beneficial reuse of spoil and any asbestos monitoring and clearance certificates must be held by the contractor and provided to Transport on project completion.	Contractor	Pre-construction / construction	Enabling work / main construction work	Additional safeguard
O6	Utilities	<p>Prior to the commencement of works:</p> <ul style="list-style-type: none"> the location of existing utilities and relocation details will be confirmed following consultation with the affected utility owners and the Western Sydney Utilities Collaboration - Technical Working Group if the scope or location of proposed utility relocation works falls outside of the assessed proposal scope and proposal area or would involve additional ground disturbance, further assessment will be undertaken. 	Contractor / Transport	Detailed design / pre-construction	Enabling work / main construction work	Additional safeguard
O7	Utilities	<p>The detailed design of the utility adjustment and relocation strategy for the proposal will consider:</p> <ul style="list-style-type: none"> planned future utilities or amplification of assets within the proposal area (as identified by utility owners) to avoid potential design conflicts potential impacts of additional loading or changes to ground levels on buried assets. 	Contractor / Transport	Detailed design / pre-construction	Enabling work / main construction work	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
O8	Hazards and risk management	<p>A Hazard and Risk Management Plan (HRMP) will be prepared and implemented as part of the CEMP. The HRMP will include, but not be limited to:</p> <ul style="list-style-type: none"> • details of hazards and risks associated with the activity • measures to be implemented during construction to minimise these risks • record keeping arrangements, including information on the materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials • a monitoring program to assess performance in managing the identified risks • contingency measures to be implemented in the event of unexpected hazards or risks arising, including emergency situations. <p>The HRMP will be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and EPA or DPIE (now DPE) publications.</p>	Contractor	Detailed design / pre-construction / construction	Main construction work	Standard safeguard
O9	Hazards and risk management	During construction, a bushfire management plan (BMP) would be prepared and included as part of the CEMP. This bushfire management plan should consider risk of construction compounds, feasible bushfire reduction methods and the potential to incorporate asset protection zones.	Contractor	Construction	Enabling work / main construction work	Additional safeguard
O10	Illegal dumping	During detailed design, further consideration will be given to any known illegal dumping areas and any appropriate mitigation measures to deter this behaviour, which should be adopted into the design.	Transport	Detailed design	N/A	Additional safeguard
O11	Utility impacts during construction	<p>Transport will consult with utility owners during construction of the proposal, including providing early notice of construction staging and timing to allow sufficient time for utility owners to schedule shutdowns and reconnect its assets, as required.</p> <p>Safe, unrestricted access will be maintained to existing utility assets during construction, where possible. Utility owners will be permitted to assess the condition of impacted assets before, during and after construction.</p>	Transport / Contractor	Construction	Enabling work / main construction work	Additional safeguard
O12	Impacts on Sydney Water assets	Sydney Water's Asset Adjustment process will be followed for the relocation, adjustment and/or protection of Sydney Water assets.	Transport	Detailed design / construction	Enabling work / main construction work	Additional safeguard
O13	Access to utilities	During detailed design, arrangements for safe access to utilities for ongoing maintenance within the proposal area will be confirmed. Any additional access track that is required will be sited to minimise environmental impacts (including on biodiversity, heritage, visual and surface water) as far as practicable.	Transport	Detailed design	N/A	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Relevant construction stage	Reference
CU1	Cumulative construction impacts	<p>Other developers would be consulted in accordance with the Community Stakeholder and Engagement Plan to:</p> <ul style="list-style-type: none"> • obtain information about project timeframes and impacts • manage the interfaces of the proposal’s staging and programming in combination with the other projects occurring in the area • identify and implement appropriate safeguards and management measures to minimise cumulative impacts. 	Transport and Contractor	Pre-construction / construction	Enabling work / main construction work	Additional safeguard
CU2	Cumulative traffic impacts	<p>Transport would coordinate with the project teams of planned developments nearby, Sydney Water, the Western Sydney Utilities Technical Group and the Transport Management Centre about the proposed timing of the road and lane closures and identify alternate routes or additional safeguards and management measures, as required.</p> <p>This would include (but not be limited to) consultation with the project teams for the Altis Warehouse and Logistics Hub, Upper South Creek Advanced Water Recycling Centre and WSEA Mamre Road Precinct developments.</p>	Transport and Contractor	Pre-construction / construction	Enabling work / main construction work	Additional safeguard
CU3	Cumulative construction impacts	<p>The CEMP would consider potential cumulative construction impacts from known surrounding development activities (see Section 6.12.3) as well as new planned development activities near the proposal, as they become known. This would include a process to regularly review and update mitigation measures as new works are identified that may lead to cumulative impacts or if complaints are received due to cumulative impacts.</p>	Transport and Contractor	Pre-construction / construction	Enabling work / main construction work	Additional safeguard

7.3 Licensing and approvals

All relevant licenses, permits, notifications and approvals needed for the Mamre Road upgrade project and when they need to be obtained are listed in Table 7-2. Additional or changed licenses and approval requirements identified in this addendum REF are indicated by underlined and/or struck out font.

Table 7-2: Summary of licensing and approval required

Instrument	Requirement	Timing
<i>Protection of the Environment Operations Act 1997 (s43)</i>	Environment protection licence (EPL) for scheduled activities [road construction] from the EPA.	Prior to start of the activity.
<i>Fisheries Management Act 1994 (s199)</i>	Notification to the Minister for Agriculture prior to any dredging or reclamation works.	A minimum of 28 days prior to the start of work.
<i>Heritage Act 1977 (s60)</i>	Permit to carry out activities to an item listed on the State Heritage Register or to which an interim heritage order applies from the Heritage Council of NSW. A Section 60 application has since been applied for and approved (HMS ID 4654, 7/12/23), which details conditions for work to proceed. These conditions would be complied with during the approved project and proposed modification.	Prior to start of the activity.
<i>National Parks and Wildlife Act 1974 (s90)</i>	Aboriginal heritage impact permit from Heritage NSW.	Prior to start of the activity.
<i>Crown Land Management Act 2016 (Division 3.4, 5.5 and 5.6)</i>	Lease or licence to occupy areas of Crown land.	Prior to start of the activity.
<i>Roads Act 1933 (s138)</i>	A Road Occupancy Licence would be required from the relevant roads authority by the contractor for prior to work on public roads.	Prior to start of the activity.
<i>State Environmental Planning Policy No 55—Remediation of Land (s16) (now consolidated as part of State Environmental Planning Policy (Resilience and Hazards) 2021)</i>	Notification about Category 2 remediation work to council	At least 30 days before the start of the activity.

8. Conclusion

This chapter provides the justification for the proposed modification taking into account its biophysical, social and economic impacts, the suitability of the site and whether or not the proposed modification is in the public interest. The proposed modification is also considered in the context of the objectives of the EP&A Act, including the principles of ecologically sustainable development as defined in Section 193 of the Environmental Planning and Assessment Regulation 2021.

8.1 Justification

8.1.1 Social factors

The proposed modification would result in positive long-term social impacts during operation by supporting the construction of the approved project. During operation, the proposed modification would:

- improve safety and amenity pedestrians and cyclists using the shared user path north of Banks Drive to the M4 Motorway
- enable better placement of signage for motorists using the ramp at the M4 Motorway and the heritage interpretation node near Mamre House
- improve safety where trees would be impacted by the approved project, such as through the removal of trees to alleviate safety concerns where trees may become unstable due to the impact on their roots from nearby utilities and road work
- enable necessary utility and property work that was identified to be required to support the upgrade of Mamre Road.

The proposed modification may result in some minor short-term impacts during construction associated with potential increases in noise and dust generation, and traffic control during utility work. These would be similar in nature to the impacts associated with the approved project and would be managed by the safeguards from the approved project.

Overall, the social benefits of the proposed modification associated with increased safety and amenity for users of Mamre Road are considered to outweigh the potential adverse social impacts identified.

8.1.2 Biophysical factors

The design of the proposed modification has been refined to minimise removal of additional native vegetation where possible. The proposed modification would result in an adjustment of the vegetation clearance boundary, and minor additional removal of native vegetation (about 0.35 hectares) and trees when compared to the approved project.

Soil and water quality impacts of the proposed modification include potential for erosion and runoff to South Creek associated with excavation including for a water main and property work during construction. This would be managed by the safeguards from the approved project, and the additional proposed safeguard in Section 6.6.4.

8.1.3 Economic factors

The proposed modification, similar to the approved project, would provide economic benefits to the community by improving connectivity to local businesses and the surrounding areas experiencing high growth. This includes the Western Sydney Employment Area and Western Sydney Aerotropolis. This would be through supporting the upgrade of Mamre Road and associated adjustments which would be required including utilities and signage adjustments. The operational benefits of the proposed modification are expected to outweigh the potential disruption to the local community and businesses during construction.

8.1.4 Public interest

The proposed modification is justified to be in the public interest on the basis that it supports and enables construction of the Mamre Road upgrade project which would improve safety and travel times along Mamre Road to address community concern. The project REF was put on public display, and issues raised by the community and government agencies were addressed in

the project submissions report. The proposed modification would not have any significant negative long-term impacts on society, the biophysical environment or the local economy.

8.2 Objects of the EP&A Act

Object	Comment
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	The proposed modification would support the approved project to improve the safety of Mamre Road for vehicles, cyclists, and pedestrians, and support businesses and other developments in the surrounding area.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	The principles of ecologically sustainable development are considered with respect to the proposed modification in Section 8.3.
1.3(c) To promote the orderly and economic use and development of land.	The proposed modification is within an existing road corridor and would support the approved project to increase safety and reduce travel times along Mamre Road to provide economic benefits to businesses and nearby development.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the proposed modification.
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	The biodiversity impacts of the proposed modification have been assessed in Section 6.1 and the Addendum BDAR. The impacts on threatened species and ecological communities have been minimised where possible, and safeguards proposed to protect the environment from potential impacts.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The need to minimise impacts on built and cultural heritage has been considered during development of the proposed modification. There would be no additional direct impacts on built and cultural heritage compared to the approved project.
1.3(g) To promote good design and amenity of the built environment.	The proposed modification is aligned with the urban design objectives for the project outlined in Section 2.3.3 of the project REF, and visual amenity impacts are considered in Section 6.8.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not relevant to the proposed modification.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the proposed modification.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	<p>Transport has carried out consultation as part of the Mamre Road upgrade project, providing an opportunity for the community to participate in the environmental planning and assessment process. This includes:</p> <ul style="list-style-type: none"> community consultation during preparation of the project REF (refer to Chapter 5 of the project REF) preparation of a Submissions report, which responded to community and stakeholder submissions received during the public display of the project REF. <p>The Community and Stakeholder Engagement Plan for the project would be applicable to the proposed modification. This addendum REF will be made available on the Transport website, so that the community and stakeholders are informed about what is being proposed.</p>

8.3 Ecologically sustainable development

Ecologically sustainable development (ESD) is development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends. The principles of ESD have been an integral consideration throughout the development of the proposed modification.

ESD requires the effective integration of economic and environmental considerations in decision-making processes. The four main principles supporting the achievement of ESD are discussed below.

8.3.1 The precautionary principle

The precautionary principle deals with reconciling scientific uncertainty about environmental impacts with certainty in decision-making. It provides that where there is a threat of serious or irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

The proposed modification has sought to take a precautionary approach to minimise environmental impacts, including through assessing impacts based on the 'worst-case' or conservative scenarios.

Safeguards and management measures have been proposed using best available technical information, environmental standards and guidelines. No safeguards have been postponed as a result of lack of scientific certainty. The selected construction contractor would be required to prepare a CEMP before commencing construction. No mitigation measures or management mechanisms would be postponed as a result of a lack of information.

8.3.2 Intergenerational equity

Social equity is concerned with the distribution of economic, social and environmental costs and benefits. Inter-generational equity introduces a temporal element with a focus on minimising the distribution of costs to future generations.

The proposed modification has integrated both short and long-term economic, social and environmental considerations so that any likely impacts are not left to be addressed by future generations. The proposed modification has avoided and/or minimised potential additional permanent adverse impacts where possible retains the potential for conversion of Mamre Road to three lanes in each direction in the future, to further reduce traffic congestion from future growth in the area if needed.

The proposed modification has sought to reduce impacts on native vegetation and species where possible, and residual biodiversity impacts would be offset as per the BDAR which was updated for the proposed modification.

8.3.3 Conservation of biological diversity and ecological integrity

Preserving biological diversity and ecological integrity requires that ecosystems, species, and biological diversity are maintained to ensure their survival. The design for the proposed modification has been specifically refined to minimise removal of native vegetation, where possible. However, there is limited cleared space for widening of Mamre Road, which means that direct impacts on ecological communities could not be completely avoided. It is accepted that this proposed modification would result in the loss of an additional 0.35 hectares of native vegetation including an additional:

- 0.05 hectares of moderate condition PCT 849 Cumberland shale plains woodland
- 0.11 hectares of low condition PCT 849 Cumberland shale plains woodland
- 0.19 hectares of moderate condition PCT 835 Cumberland riverflat forest.

The above vegetation communities are protected under State and Commonwealth legislation, as they provide potential resource and habitat for threatened species, such as the Cumberland Plain Land Snail and the Southern Myotis.

The BDAR has been updated for the proposed modification in accordance with the BAM, which concluded that the proposed modification has potential for significant impacts and identified the biodiversity offsets required to mitigate unavoidable impacts (refer to Section 481583184.449.245436 and Appendix D). These biodiversity offsets are aimed at conserving biological diversity and ecological integrity within NSW.

8.3.4 Improved valuation, pricing and incentive mechanisms

The principle of internalising environmental costs into decision making requires consideration of all environmental resources which may be affected by the carrying out of a project, including air, water, land and living things.

Environmental issues were considered as key matters in design development for the proposed modification. Environmental safeguards and management measures for the avoidance, reuse, recycling and management of waste during construction and operation are to be implemented. Implementation of these mitigation measures and safeguards would result in an economic cost to Transport, which would be included in both the capital and operating cost of the project. The value of the proposed modification to the community in terms of improved safety was also recognised.

8.4 Conclusion

This addendum REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

This has included consideration where relevant, of conservation agreements and plans of management under the NPW Act, biodiversity stewardship sites under the BC Act, wilderness areas, areas of outstanding value, impacts on threatened species, populations and ecological communities and their habitats and other protected fauna and native plants. It has also considered potential impacts to matters of national environmental significance listed under the Federal EPBC Act.

A number of potential environmental impacts from the proposed modification have been avoided or reduced during the design development and options assessment. The proposed modification as described in the addendum REF best meets the project objectives but would still result in some impacts on biodiversity, landscape and visual, construction noise water quality and traffic impacts. Safeguards and management measures as detailed in this addendum REF would ameliorate or minimise these expected impacts. The proposed modification would facilitate adjustments to utilities, minor property work and other minor work to support the upgrade of Mamre Road. The proposed modification would meet the proposal objectives by supporting the construction of the Mamre Road upgrade, providing additional facilities for walking and cycling and maintaining a safe and efficient environment for all road users. On balance the proposed modification is considered justified, and the following conclusions are made.

8.4.1 Significance of impact under NSW legislation

The proposed modification would not result in a change to the findings of the project REF and submissions report and would be likely to significantly impact threatened species or ecological communities or their habitats, within the meaning of the BC Act or FM Act. An Addendum Biodiversity Development Assessment Report has been prepared in accordance with the BC Act, Biodiversity Conservation Regulation 2017 and the BAM. The BDAR and Addendum BDAR has determined the credit obligation for the proposed modification in accordance with the Biodiversity Offsets Scheme. There would be no significant impact on any other aspect of the environment. Therefore, it is not necessary for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Public Spaces under Division 5.2 of the EP&A Act. The proposed modification is subject to assessment under Division 5.1 of the EP&A Act. Consent from Council is not required.

8.4.2 Significance of impact under Australian legislation

The proposed modification would not result in a change to the findings of the project REF and submissions report and is likely to have a significant impact on threatened species, ecological communities or migratory species, within the meaning of the EPBC Act. This addendum REF has considered the consistency of the activity with relevant recovery plans, threat abatement plans, conservation advice and guidelines provided by the Australian Government. The addendum REF finds that the activity will not threaten the long-term survival of nationally listed biodiversity matters and that suitable offset measures can be secured as set out in the Biodiversity Offset Strategy for the proposed modification.

This addendum REF has been prepared to meet the requirements of the EPBC Act strategic assessment approval for Transport Division 5.1 road activities.

The proposed modification is not likely to have a significant impact on other matters of national environmental significance or the environment of Commonwealth land within the meaning of the EPBC Act. A referral to the Australian Department of Climate Change, Energy, the Environment and Water is not required.

9. Certification

This addendum review of environmental factors provides a true and fair review of the proposed modification in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposed modification.



Zoe McLaughlin
Manager, Environment and Planning
Aurecon

Date: 8/04/2024

I have examined this addendum review of environmental factors and accept it on behalf of Transport for NSW.



Date: 9/4/2024

10. EP&A Regulation publication requirement

Respondent	Yes/No
Does this REF need to be published under section 171(4) of the EP&A Regulation?	

11. Terms and acronyms used in this addendum REF

Term /acronym	Description
ACHAR	Aboriginal cultural heritage assessment report
ACM	Asbestos containing material
Addendum REF	This report, prepared by Aurecon on behalf of Transport
AEP	annual exceedance probability
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
APEC	Areas of Potential Environmental Concern
Approved proposal area	REF proposal boundary prepared for the project REF and updated for the submissions report
Approved project	The approved Mamre Road upgrade between the M4 Motorway and Erskine Park Road project as outlined in the approved project REF and submissions report.
ARI	average recurrence interval
AQMP	Air Quality Management Plan
Aurecon	Aurecon Australasia Pty Ltd
BAM	Biodiversity Assessment Methodology
BC Act	<i>Biodiversity Conservation Act 2016 (NSW). BAM</i>
BDAR	Biodiversity Development Assessment Report
BMP	bushfire management plan
BOS	Biodiversity Offset Scheme
CEMP	Construction / Contractor's environmental management plan
CPTED	Crime Prevention Through Environmental Design
DPE	NSW Department of Planning and Environment
DPI	NSW Department of Primary Industries
DSI	Detailed Site Investigation
CNVG	<i>Construction Noise and Vibration Guideline</i> (Roads and Maritime Services, 2016)
CNVMP	Construction Noise and Vibration Management Plan
CSEP	Community and Stakeholder Engagement Plan
EIA	Environmental impact assessment
EIS	Environmental impact statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPA	NSW Environment Protection Authority (EPA)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
EPL	environment protection licence

Term /acronym	Description
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
FM Act	<i>Fisheries Management Act 1994</i> (NSW)
Heritage Act	<i>Heritage Act 1977</i> (NSW)
HRMP	Hazard and Risk Management Plan
ICNG	<i>Interim Construction Noise Guideline</i> (DECC, 2009)
LALC	Local Aboriginal Land Council
LCZ	landscape character zones
LED	light-emitting diode
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
LGA	Local government area
Modified vegetation clearance boundary	Revised vegetation clearance boundary prepared for this addendum REF
NBN	National Broadband Network
NES	Matters of national environmental significance under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
NCA	Noise Catchment Area
Niche	Niche Environment and Heritage Pty Ltd
NML	Noise Management Levels
NPW Act	<i>National Parks and Wildlife Act 1974</i> (NSW)
NSW	New South Wales
OSL	Office of Strategic Lands
OTNAR	operational traffic noise assessment report
PACHCI	<i>Procedure for Aboriginal Cultural Heritage Consultation and Investigation</i> (Roads and Maritime Services, 2011)
PAD	potential archaeological deposit
PCT	plant community type
PEMP	Project Environmental Management Plan
PMF	Probable Maximum Flood
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
Project REF	A review of environmental factors was prepared for the Mamre Road upgrade project in August 2021
Proposed modification boundary	Revised proposal area boundary prepared for this addendum REF
PSI	Preliminary Site Investigation
RAP	Remediation Action Plan
REF	review of environmental factors
RFS	Rural Fire Service
Roads Act	<i>Roads Act 1993</i>

Term /acronym	Description
Roads and Maritime	NSW Roads and Maritime was dissolved by the Transport Administration Amendment Bill in August 2019, all functions are now managed by Transport for NSW
ROL	road occupancy licence
RRO	Resource Recovery Order
RRE	Resource Recovery Exemption
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
SEPP (Biodiversity and Conservation)	State Environmental Planning Policy (Biodiversity and Conservation) 2021
SEPP (Planning Systems)	State Environmental Planning Policy (Planning Systems) 2021
SEPP (Precincts – Central River City)	State Environmental Planning Policy (Precincts – Central River City) 2021
SEPP (Precincts – Eastern Harbour City)	State Environmental Planning Policy (Precincts – Eastern Harbour City) 2021
SEPP (Precincts – Regional)	State Environmental Planning Policy (Precincts – Regional) 2021
SEPP (Precincts – Western Parkland City)	State Environmental Planning Policy (Precincts – Western Parkland City) 2021
SEPP (Resilience and Hazards)	State Environmental Planning Policy (Resilience and Hazards) 2021
SEPP (Transport and Infrastructure)	State Environmental Planning Policy (Transport and Infrastructure) 2021
SHR	State Heritage Register
SMZ	selected material zone
SOHI	Statement of Heritage Impact
Submissions report	Submissions report dated July 2022 was prepared to respond to issues raised when the project REF was placed on public display between the 25 th of August 2021 and the 26 th of September 2021 for community and stakeholder comment
SWMP	Soil and Water Management Plan
TEC	Threatened Ecological Communities
Transport	Transport for NSW
TSC Act	<i>Threatened Species Conservation Act 1995 (NSW)</i>
UFP	Unexpected Finds Protocol
WARR Act	Waste Avoidance and Resource Recovery Act 2001 (NSW)
WHS	Work Health and Safety
WM Act	<i>Water Management Act 2000 (NSW)</i>
WMP	Waste Management Plan
WSEA	Western Sydney Employment Area
QA Specifications	Specifications developed by Roads and Maritime Services for use with road work and bridge work contracts let by Transport for NSW.

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Appendix A

Consideration of section 171(2) factors and matters of National Environmental Significance and Commonwealth land

Section 171(2) checklist

In addition to the requirements of the Is an EIS required? (1995/1996) guideline and the *Roads and Related Facilities EIS Guideline* (DUAP, 1996) as detailed in the addendum REF, the following factors, listed in section 171(2) of the Environmental Planning and Assessment Regulation 2021, have also been considered to assess the likely impacts of the proposed modification on the natural and built environment.

Factor	Impact
<p>Any environmental impact on a community?</p> <p>The construction of the proposed modification would result in the following environmental impacts on the community:</p> <ul style="list-style-type: none"> • traffic delays and increased travel time during the proposed traffic control for construction of the proposed modification • temporary noise, vibration, dust and visual impacts to surrounding sensitive receivers during construction of the proposed modification 	Short-term minor negative impact
<p>Any transformation of a locality?</p> <p>The construction of the proposed modification would cause short-term disruption to the Mamre Road corridor and residents and commuters using the corridor. Construction activities would lead to temporary changes to the locality including construction barriers and traffic detours.</p> <ul style="list-style-type: none"> • The operation of the proposed modification would support the liveability, planned development and future economic growth within the locality through providing improved road safety and improved suitability of Mamre Road for pedestrians and cyclists due to the extension of the new shared path. 	<p>Short-term minor negative impact</p> <p>Long-term minor positive impact</p>
<p>Any environmental impact on the ecosystems of the locality?</p> <p>The proposed modification would involve removal of up to 0.35 hectares of native vegetation in addition to the approved project, including:</p> <ul style="list-style-type: none"> • 0.05 hectares of moderate condition PCT 849 Cumberland shale plains woodland (listed as a CEEC under the BC Act and EPBC Act) • 0.11 hectares of low condition PCT 849 Cumberland shale plains woodland (listed as a CEEC under the BC Act) • 0.19 hectares of moderate condition PCT 835 Cumberland riverflat forest (listed as an EEC under the BC Act and CEEC under the EPBC Act) <p>The proposed modification may also result in water quality impacts that may affect aquatic ecosystems within South Creek. Safeguards and mitigation measures including water quality basins, swales, scour protection and biodiversity offsets have been proposed to manage and minimise these impacts where possible.</p>	Long-term moderate negative impact, however, it is noted that a significant impact is likely for Cumberland Plain Woodland (PCT 849) – refer to MNES table
<p>Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?</p> <p>The proposed modification may result in a temporary reduction in the aesthetic and recreational quality of the area during the construction phase in the form of noise and visual impacts. The proposed modification may also result in a temporary reduction in environmental quality due to water quality impacts during construction. Safeguards and mitigation measures have been proposed to manage and minimise these impacts where possible (see Section 7.2).</p>	Short-term minor negative impact
<p>Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?</p> <p>The proposed modification would not result in any additional impact on non-Aboriginal heritage or Aboriginal heritage compared to the approved project. However, it would improve the location of the heritage interpretation node near Mamre House.</p>	Long-term minor impact

Factor	Impact
<p>Any impact on the habitat of protected fauna (within the meaning of the <i>National Parks and Wildlife Act 1974</i>)?</p> <p>The proposed modification would involve removal of habitat for threatened fauna species listed under the BC Act including:</p> <ul style="list-style-type: none"> • 0.35 hectares of habitat for Southern Myotis (listed as vulnerable under the BC Act) • 0.35 hectares of habitat for Cumberland Plain Land Snail (listed as vulnerable under the BC Act). <p>Safeguards and mitigation measures have been proposed in Section 6.1.4 to manage and minimise these impacts where possible. Biodiversity offsets required for the proposed modification in accordance with the BAM have also been identified in Section 481583184.449.274431, including the offset credit liability for Southern Myotis and Cumberland Plain Land Snail.</p>	<p>Long-term minor negative impact</p>
<p>Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?</p> <p>The proposed modification would require the removal of up to 0.35 additional hectares of endangered ecological communities. Removal of this vegetation could lead to loss of fauna and flora habitat. However, this impact to potential habitat is not considered large enough to endanger any species. Moreover, no threatened flora species have been identified within the proposed modification boundary. The proposed modification may also result in a potential for fauna injury or mortality throughout the construction phase due to vehicle and equipment movements within the proposed modification boundary. As Mamre Road is an existing operational road and the proposed modification would not alter the road layout compared to the approved project, any increased risk of roadkill during operation would be negligible. Safeguards to minimise potential impacts on threatened species have been outlined in Sections 6.1.4 and 481583184.449.275435.</p>	<p>Long-term minor negative impact</p> <p>Short-term minor negative impact</p>
<p>Any long-term effects on the environment?</p> <p>The proposed modification would result in long-term impacts on biodiversity through loss of native vegetation. However, the design of the proposed modification has and would continue to be refined to avoid and minimise long-term adverse impacts on the environment, where possible (refer to Section 2.3 and Section 7.2).</p>	<p>Long-term minor negative impact</p>
<p>Any degradation of the quality of the environment?</p> <p>If uncontrolled, the proposed modification has the potential to temporarily degrade the quality of the environment during construction through erosion, sedimentation, dust, vegetation removal and noise and vibration impacts. Several safeguards and mitigation measures have been proposed to manage and minimise these potential impacts (refer to Section 7.2).</p> <p>During operation, the quality of the environment is not likely to be degraded.</p>	<p>Short-term minor negative impact</p> <p>Long-term neutral impact</p>
<p>Any risk to the safety of the environment?</p> <p>The construction of the proposed modification may result in reduced safety for pedestrians and cyclists due to construction activities. These users would be encouraged to use alternative routes during this phase of the proposed modification.</p> <p>The operation of the proposed modification would result in increased safety for users of Mamre Road, including vehicles, pedestrians and cyclists, through the provision of improved road and active transport infrastructure.</p>	<p>Short-term minor negative impact</p> <p>Long-term minor positive impact</p>
<p>Any reduction in the range of beneficial uses of the environment?</p>	<p>Nil</p>

Factor	Impact
<p>The proposed modification would not result in a reduction in the range of beneficial uses of the environment.</p>	
<p>Any pollution of the environment?</p> <p>Providing the mitigation measures outlined in this addendum REF are implemented (refer to Section 7.2), the operation of the proposed modification is not expected to result in any pollution of the environment.</p>	<p>Nil</p>
<p>Any environmental problems associated with the disposal of waste?</p> <p>The proposed modification would result in the generation of waste. Providing the mitigation measures proposed in Section 6.11.2 are implemented, the proposed modification is not likely to cause environmental problems associated with the disposal of waste.</p>	<p>Nil</p>
<p>Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply?</p> <p>The earthwork estimates for the proposed modification estimated that there would be about 44,100 m³ more fill material that would be needed to construct the proposed modification compared to what would be excavated during construction. This material would need to be imported from a suitably licensed nearby quarry or other viable sources such as nearby infrastructure projects with excess clean excavated material. The proposed modification is not likely to result in increased demands on resources that are, or are likely to become, in short supply.</p>	<p>Nil</p>
<p>Any cumulative environmental effect with other existing or likely future activities?</p> <p>There is potential for cumulative traffic, noise and biodiversity impacts, where other projects are being constructed nearby at the same time as the proposed modification. Safeguards and management measures have been proposed in Section 6.12.2 to avoid or minimise these impacts, where possible. This includes consultation and coordination with other nearby project teams, where possible.</p>	<p>Short-term minor negative impact</p>
<p>Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?</p> <p>The proposed modification would not impact on coastal processes or hazards, including those under projected climate change conditions.</p>	<p>Nil</p>

Factor	Impact
<p>Applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1.</p> <p>The proposed modification is aligned with several strategic plans including (refer to Sections 2.1.2 and 2.1.3 of the REF for more information):</p> <ul style="list-style-type: none"> • <i>Greater Sydney Region Plan: A Metropolis of Three Cities</i> (Greater Sydney Commission, 2018), including directions to achieve: <ul style="list-style-type: none"> – A city supported by infrastructure – A city for people – A well-connected city – A city in its landscape • <i>Western City District Plan</i> (Greater Sydney Commission, 2018), including planning priorities: <ul style="list-style-type: none"> – W1: planning for a city supported by infrastructure – W3: providing services and social infrastructure to meet people’s changing needs – W7: establishing land use and transport structure to deliver a liveable, productive and sustainable Western Parkland City • <i>Penrith Local Strategic Planning Statement</i> (Penrith City Council, 2020), particularly planning priority 10: ‘provide a safe, connected and efficient local network supported by frequent public transport options’. 	<p>Long-term moderate positive impact</p>
<p>Other relevant environmental factors</p>	<p>In considering the potential impacts of this proposed modification all relevant environmental factors have been considered, refer to Chapter 6 of this assessment.</p>

Matters of National Environmental Significance and Commonwealth land

Under the environmental assessment provisions of the EPBC Act, the following matters of national environmental significance and impacts on Commonwealth land are required to be considered to assist in determining whether the proposed modification should be referred to the Australian Government Department of Climate Change, Energy, the Environment and Water.

Under the EPBC Act strategic assessment approval a referral is not required for proposed road actions that may affect nationally listed threatened species, populations, endangered ecological communities and migratory species. Impacts on these matters are assessed in detail as part of this addendum REF in accordance with Australian Government significant impact criteria and taking into account relevant guidelines and policies.

Factor	Impact
<p>Any impact on a World Heritage property?</p> <p>There are no World Heritage properties within or near the proposed modification</p>	Nil
<p>Any impact on a National Heritage place?</p> <p>There are no National Heritage places within or near the proposed modification.</p>	Nil
<p>Any impact on a wetland of international importance?</p> <p>There are no wetlands of international importance within or near the proposed modification.</p>	Nil
<p>Any impact on a listed threatened species or communities?</p> <p>The unavoidable impacts to Commonwealth threatened biodiversity include the following:</p> <ul style="list-style-type: none"> • direct impact to about 0.16 hectares of Cumberland Plain Woodland, which meets the Commonwealth CEEC definition • direct impact to about 0.19 hectares of River-Flat Eucalypt Forest, which meets the Commonwealth CEEC definition. <p>Assessments of Significance for the above threatened biodiversity were completed, and have been provided in the addendum BDAR in Appendix D. It was concluded that the additional direct biodiversity impacts would not change the conclusions regarding the significance of impacts compared to the approved project.</p> <p>The proposal will result in a biodiversity offset for Cumberland Plain Woodland, and River-flat Eucalypt Forest, which in turn will ensure the in-perpetuity management of these EPBC Act listed TECs.</p> <p>Assessment of impacts is provided in Section 6.1.3. Further safeguards and management measures are outlined in Section 6.1.4.</p>	<p>Significant direct impacts may occur on Cumberland Plain Woodland. This addendum REF and BDAR has been prepared to meet the requirements of the EPBC Act strategic assessment approval for Transport Division 5.1 road activities.</p>
<p>Any impacts on listed migratory species?</p> <p>The addendum BDAR in Appendix D does not identify impacts on migratory species for the proposed modification.</p>	Nil
<p>Any impact on a Commonwealth marine area?</p> <p>There are no Commonwealth marine areas within or near the proposed modification.</p>	Nil
<p>Does the proposed modification involve a nuclear action (including uranium mining)?</p> <p>The proposed modification would not involve any nuclear action.</p>	Nil
<p>Additionally, any impact (direct or indirect) on Commonwealth land?</p> <p>The proposed modification would not result in any direct or indirect impact on Commonwealth land.</p>	Nil

Appendix B

Statutory consultation checklists

Matters of National Environmental Significance and Commonwealth land

Certain development types

Development type	Description	Yes / No	If 'yes' consult with	SEPP (Transport and Infrastructure) section
Car park	Does the project include a car park intended for the use by commuters using regular bus services?	No	Penrith City Council	Section 2.110
Bus depots	Does the project propose a bus depot?	No	Penrith City Council	Section 2.110
Permanent road maintenance depot and associated infrastructure	Does the project propose a permanent road maintenance depot or associated infrastructure such as garages, sheds, tool houses, storage yards, training facilities and workers' amenities?	No	Penrith City Council	Section 2.110

Development within the Coastal Zone

Issue	Description	Yes / No / N/A	If 'yes' consult with	SEPP (Transport and Infrastructure) section
Development with impacts on certain land within the coastal zone	Is the proposal within a coastal vulnerability area and is inconsistent with a certified coastal management program applying to that land?	No	Penrith City Council	Section 2.14

Note: See interactive map [Coastal management - \(nsw.gov.au\)](https://www.nsw.gov.au). Note the coastal vulnerability area has not yet been mapped.

Note: a certified coastal zone management plan is taken to be a certified coastal management program.

Council related infrastructure or services

Development type	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	SEPP (Transport and Infrastructure) section
Stormwater	Are the works likely to have a substantial impact on the stormwater management services which are provided by council?	No	Penrith City Council	Section 2.10
Traffic	Are the works likely to generate traffic to an extent that will strain the capacity of the existing road system in a local government area?	No	Penrith City Council	Section 2.10
Sewerage system	Will the works involve connection to a council owned sewerage system? If so, will this connection have a substantial impact on the capacity of any part of the system?	No	Penrith City Council	Section 2.10
Water usage	Will the works involve connection to a council owned water supply system? If so, will this require the use of a substantial volume of water?	No	Penrith City Council	Section 2.10
Temporary structures	Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a minor or inconsequential disruption to pedestrian or vehicular flow?	No	Penrith City Council	Section 2.10
Road and footpath excavation	Will the works involve more than minor or inconsequential excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	No	Penrith City Council	Section 2.10

Local heritage items

Development type	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	SEPP (Transport and Infrastructure) section
Local heritage	Is there is a local heritage item (that is not also a State heritage item) or a heritage conservation area in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the heritage significance of the item/area are more than minor or inconsequential?	No	Penrith City Council	Section 2.11

Flood liable land

Development type	Potential impact	Yes / No	If 'yes' consult with	SEPP (Transport and Infrastructure) section
Flood liable land	Are the works located on flood liable land? If so, will the works change flood patterns to more than a minor extent?	No	Penrith City Council	Section 2.12

Development type	Potential impact	Yes / No	If 'yes' consult with	SEPP (Transport and Infrastructure) section
Flood liable land	Are the works located on flood liable land? (to any extent). If so, do the works comprise more than minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance	No	State Emergency Services Email: erm@ses.nsw.gov.au	Section 2.13

Note: Flood liable land means land that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the manual entitled Floodplain Development Manual: the management of flood liable land published by the New South Wales Government.

Public authorities other than councils

Development type	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	SEPP (Transport and Infrastructure) section
National parks and reserves	Are the works adjacent to a national park or nature reserve, or other area reserved under the <i>National Parks and Wildlife Act 1974</i> , or on land acquired under that Act?	No	NSW Department of Climate Change, Energy, the Environment and Water	Section 2.15
National parks and reserves	Are the works on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	No	NSW Department of Climate Change, Energy, the Environment and Water	Section 2.15
Aquatic reserves and marine parks	Are the works adjacent to an aquatic reserve or a marine park declared under the <i>Marine Estate Management Act 2014</i> ?	No	Department of Industry	Section 2.15
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the <i>Sydney Harbour Foreshore Authority Act 1998</i> ?	No	Sydney Harbour Foreshore Authority	Section 2.15
Bush fire prone land	Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional centre or group home in bush fire prone land?	No	Rural Fire Service	Section 2.15
Artificial light	Would the works increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map? (Note: the dark sky region is within 200 kilometres of the Siding Spring Observatory)	No	Director of the Siding Spring Observatory	Section 2.15
Defence communications buffer land	Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in section 5.15 of Lockhart LEP 2012, Narrandera LEP 2013 and Urana LEP 2011).	No	Secretary of the Commonwealth Department of Defence	Section 2.15
Mine subsidence land	Are the works on land in a mine subsidence district within the meaning of the <i>Mine Subsidence Compensation Act 1961</i> ?	No	Mine Subsidence Board	Section 2.15

Appendix C

Hydrology Assessment

Memorandum

To	Shirley Luong	From	Colin Matthews
Copy		Reference	520889
Date	2023-08-21	Pages (including this page)	6
Subject	MRUS1-DD-Flood Impact Assessment Addendum REF - Basin Filling Works Rev B		

1 Introduction

As part of the Mamre Road Upgrade Stage 1 Detailed Design works, an existing basin within DP 238969 Lot 11 is proposed to be filled. The filling of this basin was not previously identified or assessed in the approved Review of Environmental Factors (REF) for the Mamre Road upgrade. These works encroach on the original proposal area as per the REF (referred to as the REF boundary) and so a revised boundary has been established to capture this additional work (referred to as the revised REF boundary). The existing basin volume is estimated to have a total volume of 120 m³ which will reduce to 103 m³ after basin filling works. Figure 1 outlines the location of basin filling works as part of the IFT design and revised REF boundary.

The purpose of this Technical Memorandum is to assess the impact the filling works has on flood behaviour, and to identify risks, if any, on potential adverse flood impact outcomes as a result of the modified works to support preparation of an Addendum REF.

The proposed basin filling works is incorporated in Detailed Design for the IFT design stage. Flood modelling has been carried out as part of the IFT stage with inclusion of the basin filling works. Outcomes of flood modelling for the revised REF boundary with basin filling works will be based on the IFT design.

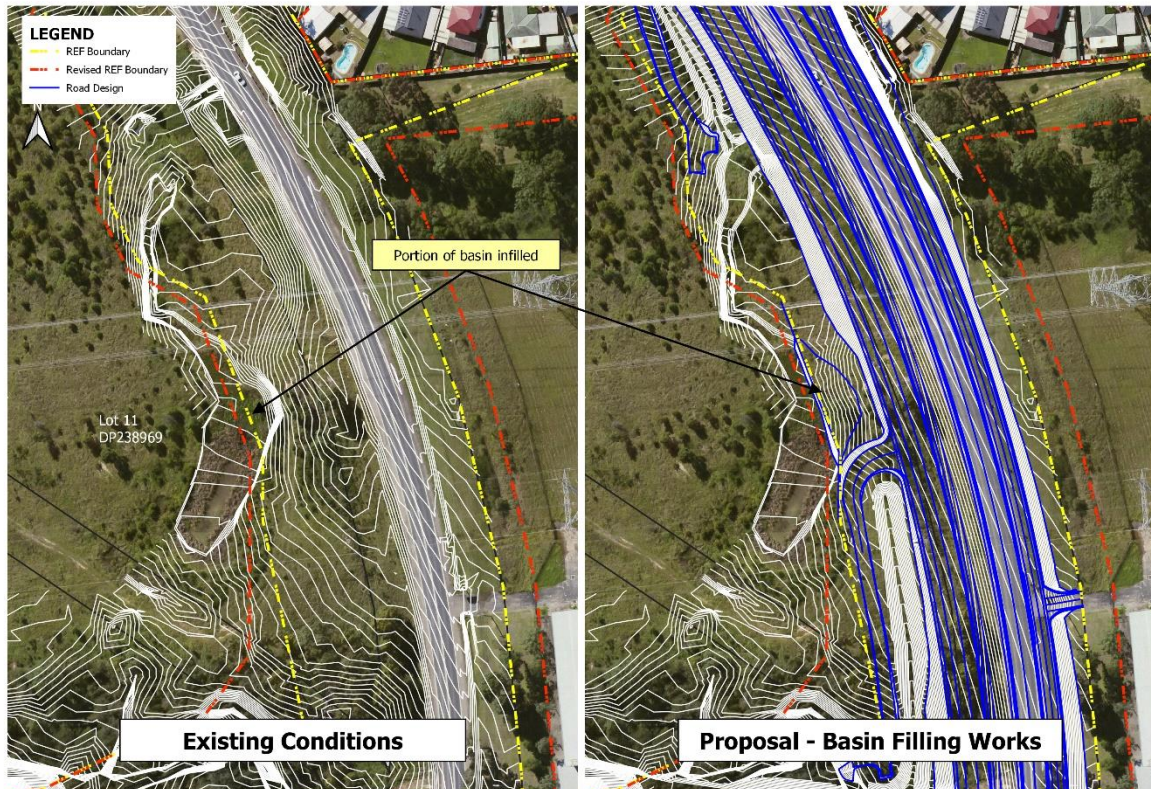


Figure 1: Basin filling works and revised REF boundary

2 Flood Level Impacts

2.1 Local Flood

As a result of storage loss by partially filling the existing basin, there are minor changes in extent of flood level increases from existing in the 0.02 m to 0.05 m range for the 1% AEP flood. This minor increase in flood extent is localised within 6 m of the existing inlet stream of this existing basin. Figure 2 shows 1% AEP local flood level impacts for the REF and IFT design.

More frequent floods such as the 10% and 2% AEP events experience similar extents as the 1% AEP flood impacts. The 5% AEP flood event experiences a greater flood extent of flood level increases from existing between 0.02 m to 0.05 m from both the REF design and IFT design. As a result of basin filling works from the IFT design, there is a consistent extent of adverse impacts, however a minor increase in impacts in the 0.05 m to 0.10 m range in the 5% AEP flood. Figure 3 shows 5% AEP local flood level impacts for the REF and IFT design.

The area where flood impacts occur are situated within dense vegetation where no dwellings, buildings or major infrastructure exist. As increases in flood levels and extents are minor and occur in densely vegetated land, flood impacts are considered inconsequential.

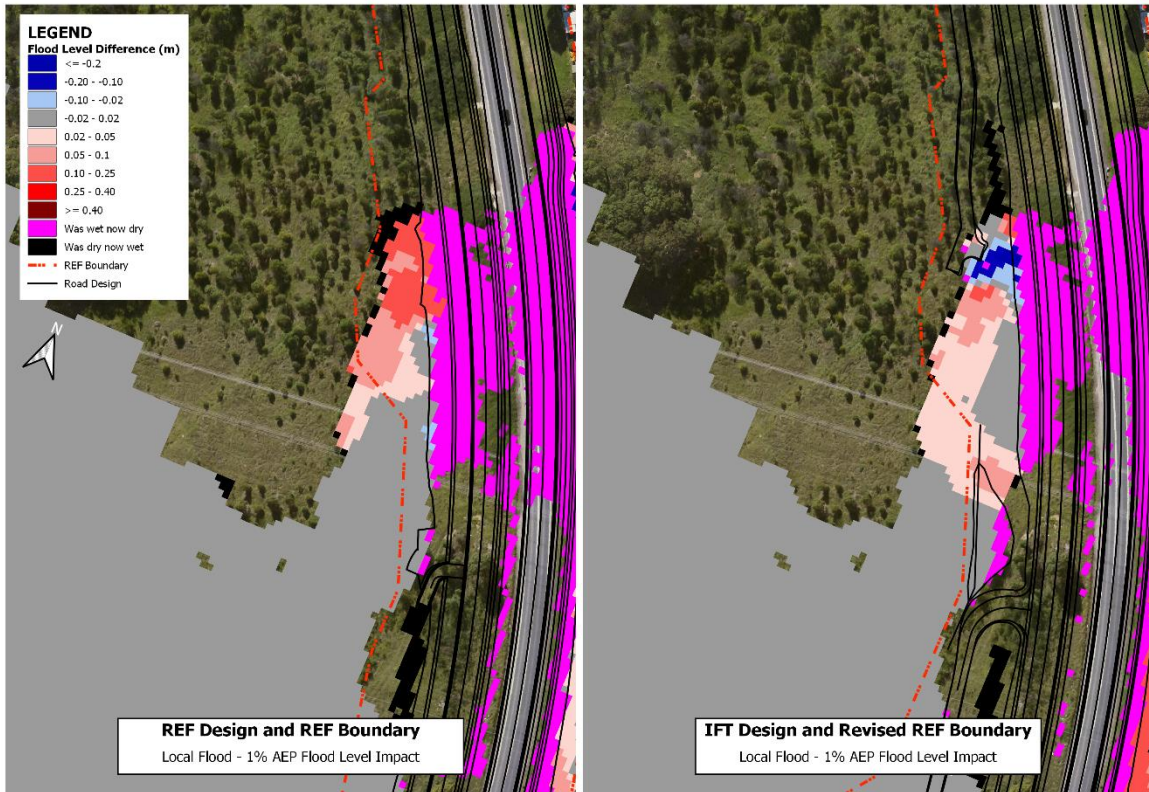


Figure 2: 1% AEP local flood level impacts

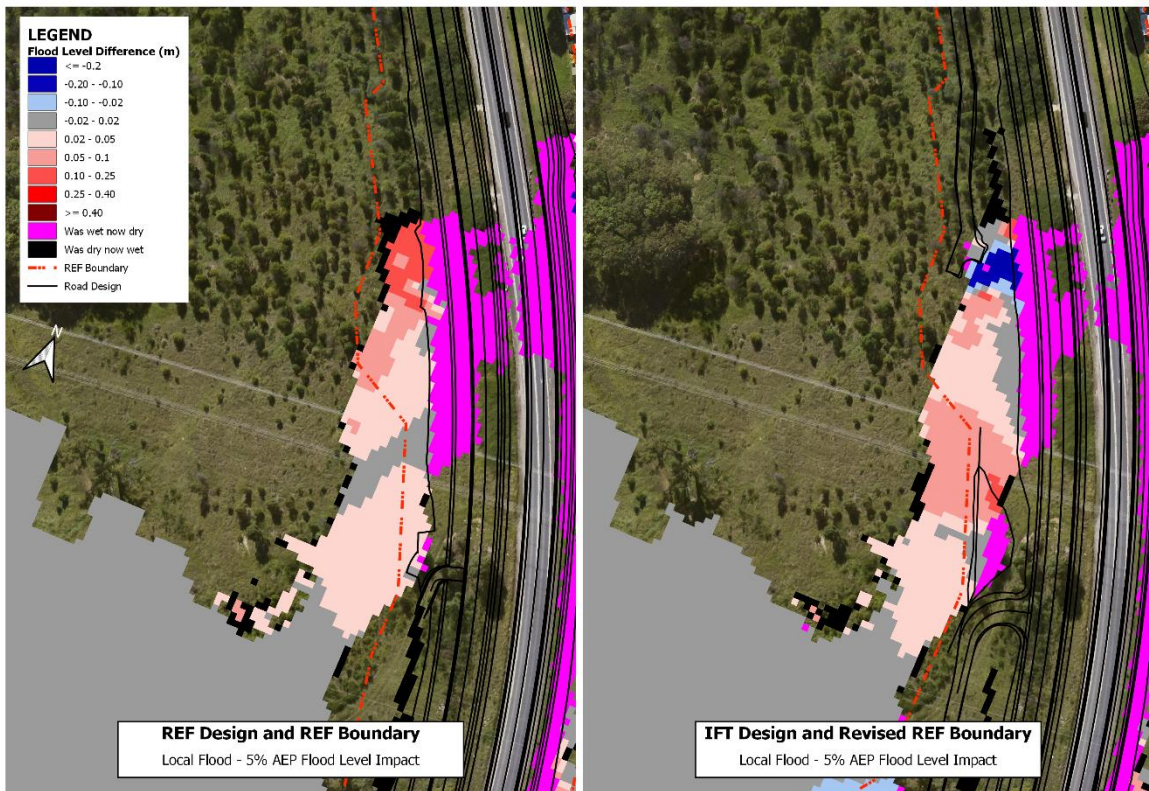


Figure 3: 5% AEP local flood level impacts

2.2 Mainstream Flood

As a result of partially filling the existing basin, there are no changes in flood level impacts for all events up to and including the 1% AEP mainstream flood event.

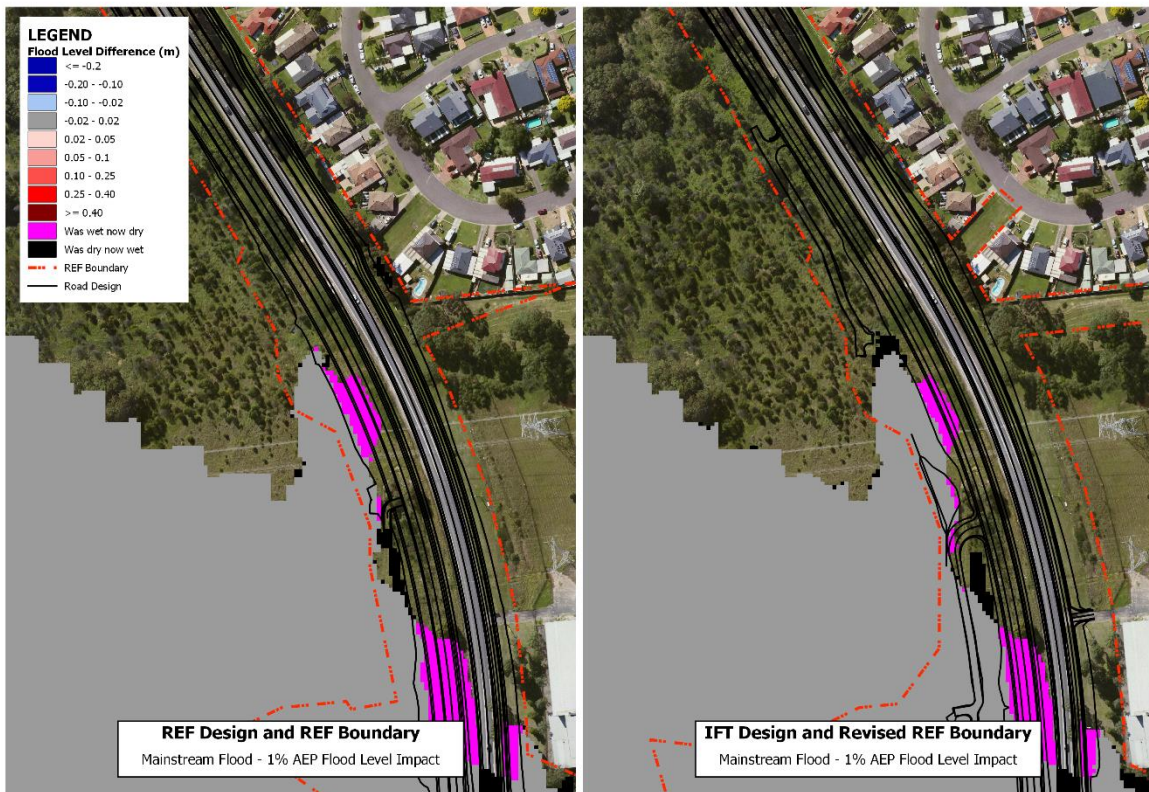


Figure 4: 1% AEP mainstream flood level impacts

3 Flood Velocity Impact

Flood velocity impacts are assessed to determine if changes in flood velocity as a result of the proposal increases risk of erosion to the flood plain. Aerial imagery over the past five years indicates that the floodplain in this region of the South Creek tributary consists of tall natural grass cover surrounded by moderately erodible soil. For design embankments, urban design has proposed planted “Zoysia Matrella” turf rolls and planted Australian native grasses.

Managing Urban Stormwater: Soils and Construction Volume 1, 4th Edition (Landcom, 2004) (Bluebook Volume 1) provides guidance on assessing the risk to erosion as a function of flood velocity and time of inundation for various material types. As described above, the floodplain and embankments are assessed as grass with moderate erodibility.

3.1 Local Flood

The critical durations for the local overland flood event ranges from the 10 minute to the 2 hour storm. Table 5-2 of Bluebook Volume 1 indicates that grassed land with moderate erodibility is resistant to erosion for flow velocities up to 1.8 m/s for inundation times less than 6 hours.

Flood velocity impact mapping of both the REF and Revised REF designs for the 1% AEP local overland flood are presented in Figure 5. Regions where land is prone to local overland flooding for

design velocities greater than 1.8 m/s are hatched in magenta. Both the REF and Revised REF designs generate no adverse impact on the risk to erosion as all regions experiencing a change in velocity are below the local flood erodibility threshold. There is one localised region in both designs experiencing velocities above 1.8 m/s however no flood velocity differences occur in this region.

Maximum flood velocities along the embankment of basin filling works are no more than 1.25 m/s. As this is less than the 1.8 m/s erodibility threshold, there is a low risk to erosion to embankments from basin filling works.

The effect of basin filling works in the Revised REF produces negligible impact to the risk of erosion to the flood plain and to design embankments for the local overland flood.

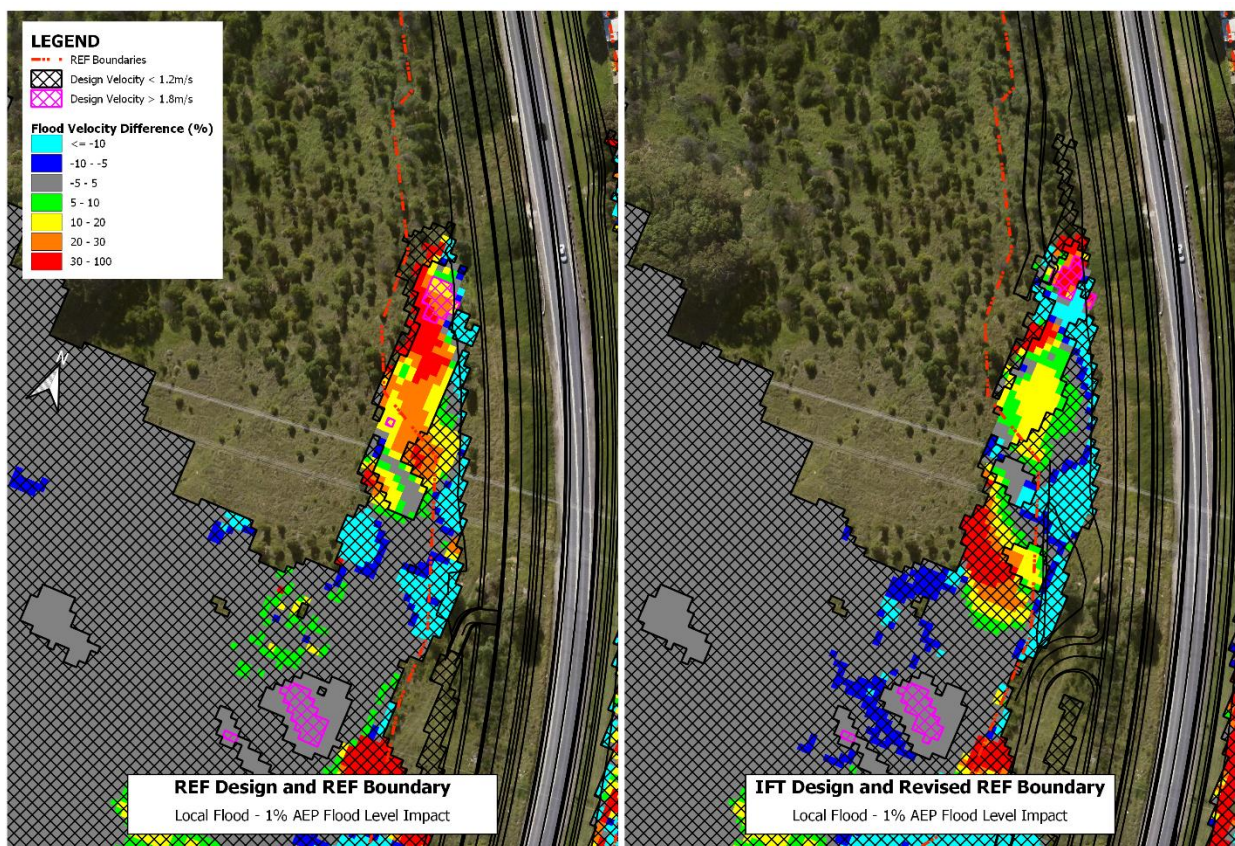


Figure 5: 1% AEP local flood velocity impact mapping

3.2 Mainstream Flood

The critical duration of the mainstream regional South Creek 1% AEP flood is a long duration 36 hours event. Table 5-2 of Bluebook Volume 1 indicates that grassed land with moderate erodibility is resistant to erosion for flow velocities up to 1.2 m/s for inundation times between 24 and 48 hours.

Flood velocity impact mapping of both the REF and Revised REF designs for the 1% AEP mainstream regional South Creek flood are presented in Figure 6. Regions where land is erosion resistant to regional flooding for design velocities less than 1.2 m/s are hatched in black. Both the REF and Revised REF designs generate no adverse impact on the risk to erosion as all regions experiencing a change in velocity are below the regional flood erodibility threshold.

The maximum flood velocities in the vicinity of the floodplain and along the embankment of the basin filling works are no more than 0.45 m/s. As this is less than the 1.2 m/s erodibility threshold, there is a low risk to erosion to embankments of basin filling works.

The effect of basin filling works in the Revised REF provides negligible impact to the risk of erosion to the flood plain and to design embankments for the mainstream regional South Creek flood.

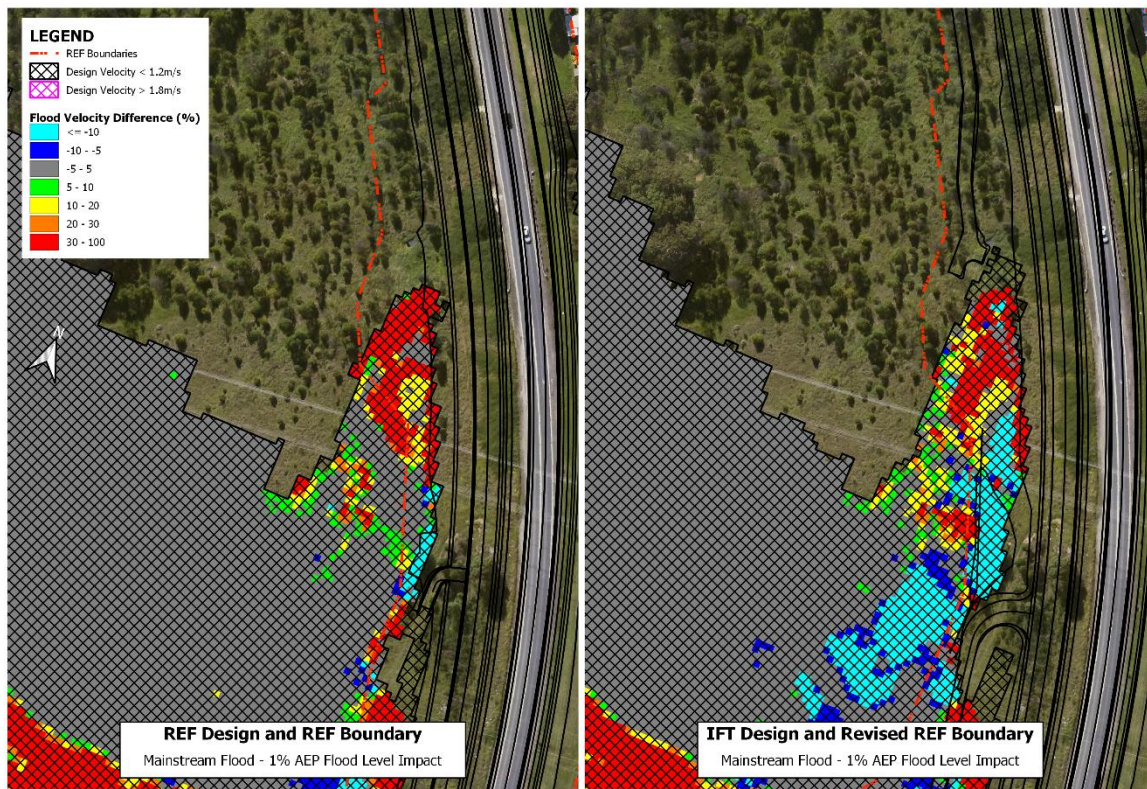


Figure 6: 1% AEP mainstream flood velocity impact mapping

4 PMF Impact

The impact of the Probable Maximum Flood (PMF) assesses the change in risk-to-life flood hazard category as a result of proposed noise walls upstream of the proposal. As the basin filling works are situated downstream of noise walls, basin filling works do not affect flood hazard outcomes to upstream properties.

5 Road Flood Immunity

Flood modelling confirms that the full length of the proposal remains immune to the 1% AEP flood in both Local Flood and Mainstream Flood events as required by the Design Requirements. Basin filling works do not affect immunity requirements of the proposal.

6 Conclusion

As a result of partial basin filling works as part of the revised REF boundary, flood modelling confirms that there are negligible changes to flood impacts and are consistent with the REF flood impact assessment.

Appendix D

Addendum Biodiversity Development Assessment Report



Addendum Biodiversity Development Assessment Report (BDAR)

Mamre Road upgrade between the M4 Motorway and
Erskine Park Road

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Executive summary

Project outline

In 2021, Transport for NSW (Transport) proposed to upgrade about 3.8 kilometres of Mamre Road to a four-lane divided road to improve road safety and movement between the M4 Motorway and Erskine Park Road. A review of environmental factors (REF) was prepared for the Mamre Road Upgrade Stage 1 in August 2021 (referred to as the project REF). The project REF was placed on public display between the 25th of August 2021 and the 26th of September 2021 for community and stakeholder comment. A submissions report dated July 2022 was prepared to respond to issues raised (referred to as the project submissions report). The project was determined in July 2022.

Transport now proposes to modify the approved project to facilitate adjustments to utilities, minor property work and other minor work to support the upgrade of Mamre Road (referred to as the proposed modification).

Niche has been commissioned to prepare an Addendum Biodiversity Development Assessment Report (BDAR) to support the Addendum Review of Environmental Factors (REF) for the proposed modification.

Results

The field survey confirmed that an additional 0.35 hectares of native vegetation and associated habitat would be directly impacted.

The proposed modification would increase the vegetation clearing to two Plant Community Types (PCTs):

- PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
- PCT 835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion.

The PCTs are also listed as the following Threatened Ecological Communities (TECs) under both State and Commonwealth Legislation:

- PCT 849 aligns to Cumberland Plain Woodland which is listed as Critically Endangered Ecological Community (CEEC) under the *NSW Biodiversity Conservation Act 2016* (BC Act) and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- PCT 835 aligns to River-flat Eucalypt Forest which is listed as a CEEC under the BC Act and Endangered Ecological Community (EEC) under the EPBC Act.

No threatened flora species were identified during the field investigations for the proposed modification.

The proposed modification would result in an additional 0.35 hectares of impact to two threatened biodiversity species that are regarded as 'species credits' as per the requirements of the BAM: Cumberland Plain Land Snail, and Southern Myotis.

Biodiversity offsetting

The unavoidable impacts of the proposed modification on ecological values includes the clearing of an additional 0.35 hectares of vegetation.

Through the application of the BAM, associated guidelines and the BAM-C, the following additional biodiversity credit offsets are required to offset the unavoidable impacts:

- 7 x credits for PCT 835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
- 2 x credits for PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
- 9 x credits for Southern Myotis
- 9 x credits for Cumberland Plain Land Snail.

Glossary

Definitions

Accredited person or assessor	Means as person accredited under section 6.10 (of the BC Act) to prepare reports in accordance with the BAM.
Approved proposal area	The REF proposal boundary prepared for the project REF and updated for the submissions report as per the approved project.
Approved project	The approved Mamre Road upgrade between the M4 Motorway and Erskine Park Road project as outlined in the approved project REF and submissions report.
Biodiversity credit report	The report produced by the BAM-C that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site (DPIE 2020).
Biodiversity offsets	The gain in biodiversity values achieved from the implementation of management actions on areas of land, to compensate for losses to biodiversity values from the impacts of development (DPIE 2020)
Biodiversity Stewardship site	Refers to land which is the subject to a Biodiversity Stewardship Site agreement under the BC Act
Bionet Vegetation classification	Refers to the vegetation community-level classification for use in vegetation mapping programs and regulatory biodiversity impact assessment frameworks in NSW. The BioNet Vegetation Classification is published by the Department and available at www.environment.nsw.gov.au/research/Visclassification.htm .
Biodiversity Offsets and Agreement Management System	The system used to administer the Biodiversity Offsets Scheme. BOAM is used to access the version of the Calculator that can be used to perform and submit BAM assessments, submit BAM related applications, generate a credit obligation, calculate a credit price or apply to sell or retire credits.
BioNet Atlas	The DPIE database of flora and fauna records (formerly known as the NSW Wildlife Atlas). The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails listed under the BC Act) and some fish (DPIE 2020).
Calculator or BAM-C	Biodiversity Assessment Method Calculator – a tool that applies the BAM to calculate the number and type of credits required to offset the impacts of development on biodiversity or credits generated at a biodiversity stewardship site.
Cumulative impact	The extent to which the development or activity contributes to the cumulative impacts of existing and planned developments or activities on

Definitions

	threatened species, ecological communities, habitats, Areas of Outstanding Biodiversity Value and key threatening processes.
Direct impact	Direct impacts on biodiversity values include those related to clearing native vegetation and threatened species habitat, and impacts on biodiversity values prescribed by the Biodiversity Conservation Regulation 2017 (the BC Regulation) (DPIE 2020)
Ecosystem credit	A measurement of the value of EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur with a PCT. Ecosystem credits measure the loss in biodiversity values at a development site and the gain in biodiversity values at a biodiversity stewardship site.
Ecosystem credits	A measurement of the value of threatened ecological communities, threatened species habitat for species that can be reliably predicted to occur with a PCT, and PCTs generally. Ecosystem credits measure the loss in biodiversity values at a development, activity, clearing or biodiversity certification site and the gain in biodiversity values at a biodiversity stewardship site (DPIE 2020).
Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community, including any biotic or abiotic component.
Indirect impact	Impacts that occur when the proposal affects native vegetation and threatened species habitat beyond the development footprint or within retained areas (e.g. transporting weeds or pathogens, dumping rubbish). This includes impacts from activities related to the construction or operational phase of the proposal and prescribed impacts (DPIE 2020).
MNES	A matter of national environmental significance (MNES) protected by a provision of Part 3 of the EPBC Act (Cth)
Mitchell landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000 (DPIE 2020).
Mitigation	Action to reduce the severity of an impact (OEH 2014).
Modified vegetation clearance boundary	The revised vegetation clearance boundary prepared for the proposed modification.
Native vegetation	(a) trees (including any sapling or shrub or any scrub), (b) understorey plants , (c) groundcover (being any type of herbaceous vegetation), (d) plants occurring in a wetland. A plant is native to New South Wales if it was established in New South Wales before European settlement (BC Act).

Definitions

PlantNET NSW	An online database of the flora of New South Wales which contains currently accepted taxonomy for plants found in the State, both native and exotic.
Population	A group of organisms, all of the same species, occupying a particular area (DPIE 2020).
Proposal area	The area of land that is directly impacted on by the proposal that is being assessed under the EP&A Act, including access roads, and areas used to store construction materials (OEH 2014). It includes the construction and operational areas for the proposal.
Proposed modification boundary	The revised proposal area prepared for the proposed modification.
Spatial datasets	<p>Spatial databases required to prepare a BDAR</p> <ul style="list-style-type: none"> ○ BioNet NSW (Mitchell) Landscapes – Version 3.1 ○ NSW Interim Biogeographic Regions of Australia (IBRA region and sub-regions) – Version 7 ○ NSW soil profiles ○ hydrogeological landscapes ○ acid sulfate soils risk ○ digital cadastral database ○ Vegetation Information Systems maps ○ Geological sites of NSW.
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
Target species	A species has been identified within the assessment area or is considered to have a moderate to high likelihood of occurrence and may be impacted by the proposal.
Threatened Biodiversity Data Collection	<p>A publicly assessable online database (registration required) which contains information for listed threatened species, populations and ecological communities.</p> <p>Part of the BioNet database, published by EES and accessible from the BioNet website at www.bionet.nsw.gov.au.</p>
Vegetation clearing boundary	The area of vegetation to be directly impacted by the proposal during construction activities.

Abbreviations

AOBV	Area of Outstanding Biodiversity Value
BAM	Biodiversity Assessment Method
BC Act	<i>Biodiversity Conservation Act 2016 (NSW)</i>
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BDAR	Biodiversity Development Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offset Scheme
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DPE	NSW Department of Planning and Environment
DPI	Department of Primary Industries
EEC	Endangered ecological community
EES	NSW Environment Energy and Science Group within the Department of Planning, Industry and Environment
Environment Agency Head	Environment Agency Head, Environment, Energy and Science Group, Department of Planning, Industry and Environment
EP&A Act	<i>Environment Planning and Assessment Act 1979 (NSW)</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth).</i>
Fisheries NSW Policy and Guidelines	Fisheries NSW Policy and guidelines for fish habitat conservation and management (Update 2013)
FM Act	<i>Fisheries Management Act 1994 (NSW)</i>
GDE	Groundwater dependent ecosystems
IBRA	Interim Biogeographically Regionalisation of Australia
MNES	Matters of National Environmental Significance
PCT	Plant Community Type

Abbreviations

REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy
SAII	Serious and Irreversible Impacts
TBDC	Threatened Biodiversity Data Collection
TECs	Threatened ecological communities (VECs, EECs and CEECs)
TfNSW	Transport for NSW
VEC	Vulnerable Ecological Community
VIS	Vegetation information system

1 Introduction

1.1 Proposed modification overview

In 2021, Transport for NSW (Transport) proposed to upgrade about 3.8 kilometres of Mamre Road to a four-lane divided road to improve road safety and movement between the M4 Motorway and Erskine Park Road. A review of environmental factors (REF) was prepared for the Mamre Road Upgrade Stage 1 project in August 2021 (referred to as the project REF). The project REF was placed on public display between the 25th of August 2021 and the 26th of September 2021 for community and stakeholder comment. A submissions report dated July 2022 was prepared to respond to issues raised (referred to as the project submissions report). The project was determined in July 2022.

Transport now proposes to modify the approved project to facilitate adjustments to utilities, minor property work and other minor work to support the upgrade of Mamre Road (referred to as the proposed modification). Key features of the proposed modification include:

- basin filling work and refinements to drainage channels
- property work including the addition of new parking areas at Erskine Park Rural Fire Service, adjustment to the driveway at the KFC fast food restaurant, and relocation of an existing earth mound within private property
- removal of additional trees identified by an arborist to have likely root impacts from the road upgrade work
- extension of the shared path between Banks Drive and the M4 Motorway
- relocation of the heritage node near Mamre House
- provision of additional space to enable fence construction
- construction of a turning tee to connect to an existing access track
- relocation of existing signage near the northern extent of the approved proposal area to an existing post
- utilities that may require additional excavation outside of the approved proposal area.

It is anticipated that construction would start in early 2024.

Niche has been commissioned to prepare an Addendum Biodiversity Development Assessment Report (BDAR) to support the Addendum Review of Environmental Factors (REF) for the proposed modification.

1.2 Purpose of this Addendum BDAR

A BDAR was approved for the Mamre Road Upgrade Stage 1 in 2022.. Since that time, Transport has proposed to modify the approved project, which would result in an increase in about 0.35 hectares of vegetation/habitat clearing.

In accordance with section 6.16 of the NSW *Biodiversity Conservation Act 2016* (BC Act), a biodiversity assessment report cannot be modified or withdrawn after a planning approval, a vegetation clearing approval or biodiversity certification has been granted in reliance on the report.

As such, this Addendum BDAR provides an updated impact assessment and biodiversity offset for the proposed modification associated with 0.35 hectares of vegetation/habitat clearing.

The Niche Assessor who has prepared this Addendum BDAR is Luke Baker. Luke Baker (Accredited BAM Assessor (BAAS17033) prepared the BDAR (Niche 2022). Luke has over 15 years of experience, working as a botanist, and has extensive experience working on major projects and significant biodiversity offset strategies throughout NSW.

1.3 Changes to vegetation clearance boundary

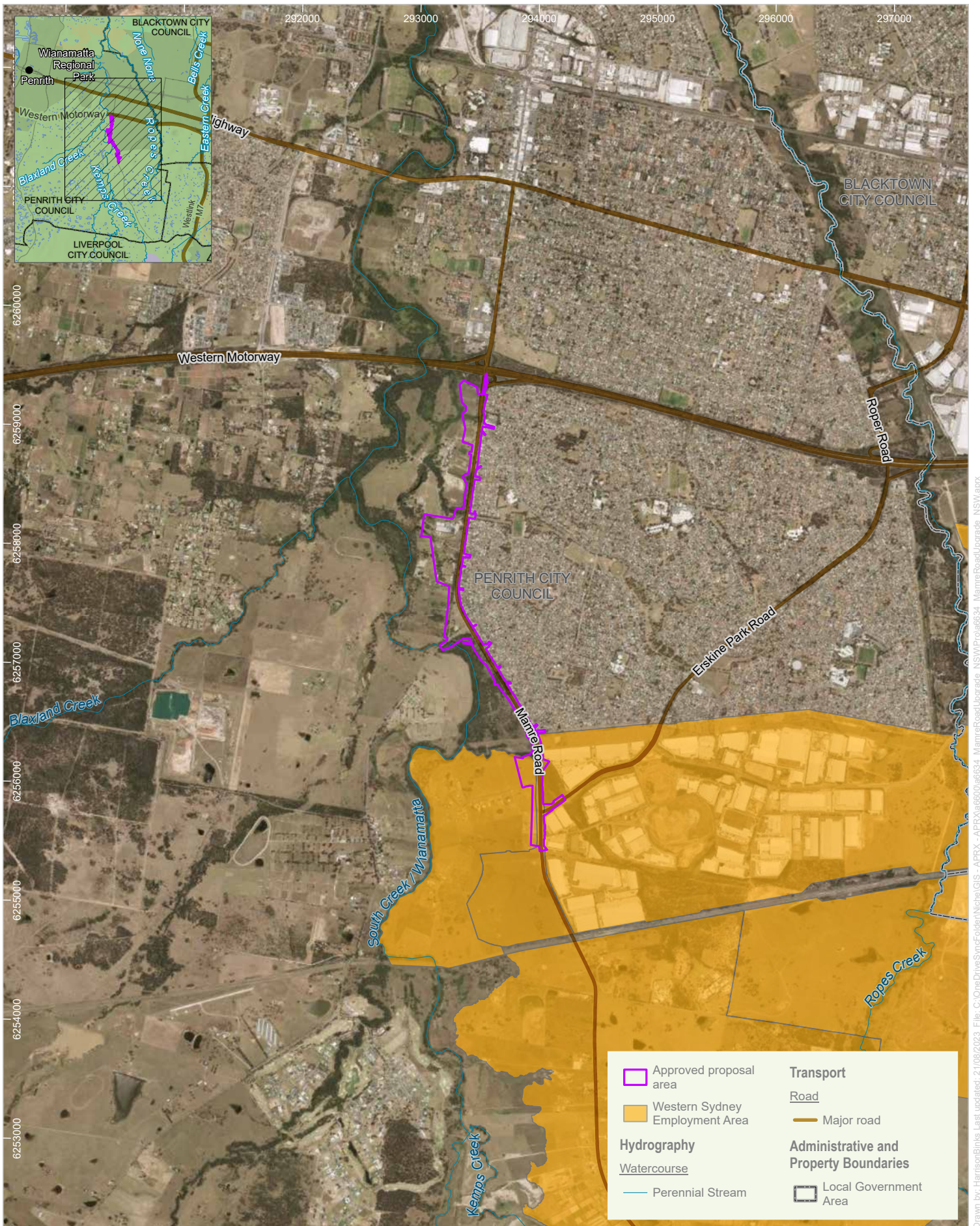
The approved proposal area contains all areas required for ground disturbance (including construction and operation) and encompasses the key infrastructure elements as summarised in Section 1.2, and detailed in the REF and submissions report for the approved project (Figure 1). The approved proposal area encompasses a 'vegetation clearance boundary' which is where ground disturbance was proposed and was the focus of the approved BDAR.

The proposed modification involves minor changes to the approved proposal area and approved 'vegetation clearance boundary'. The revised boundaries as per the proposed modification are referred to as the 'proposed modification boundary' and 'modified vegetation clearance boundary'. Native vegetation occupies about 9.65 hectares of the modified vegetation clearance boundary, which predominately consists of scattered native eucalypts as discussed in Chapter 3.

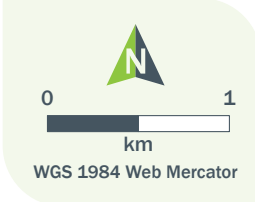
The additional area within the modified vegetation clearance boundary is associated with the native vegetation that must be cleared to support construction of the proposed modification. The modified vegetation clearance boundary is a total of 9.65 hectares, of which, about 9.30 ha has been assessed in the BDAR (Niche 2022), and an additional 0.35 hectares associated with the proposed modification.

Table 1-1. Vegetation clearing associated with Addendum BDAR

Assessment	Area of vegetation clearing required (ha)
BDAR (2022)	9.30
Addendum BDAR	0.35
Total	9.65



Approved proposal area	Transport
Western Sydney Employment Area	Road
Hydrography	Major road
Watercourse	Administrative and Property Boundaries
Perennial Stream	Local Government Area



Location of proposal

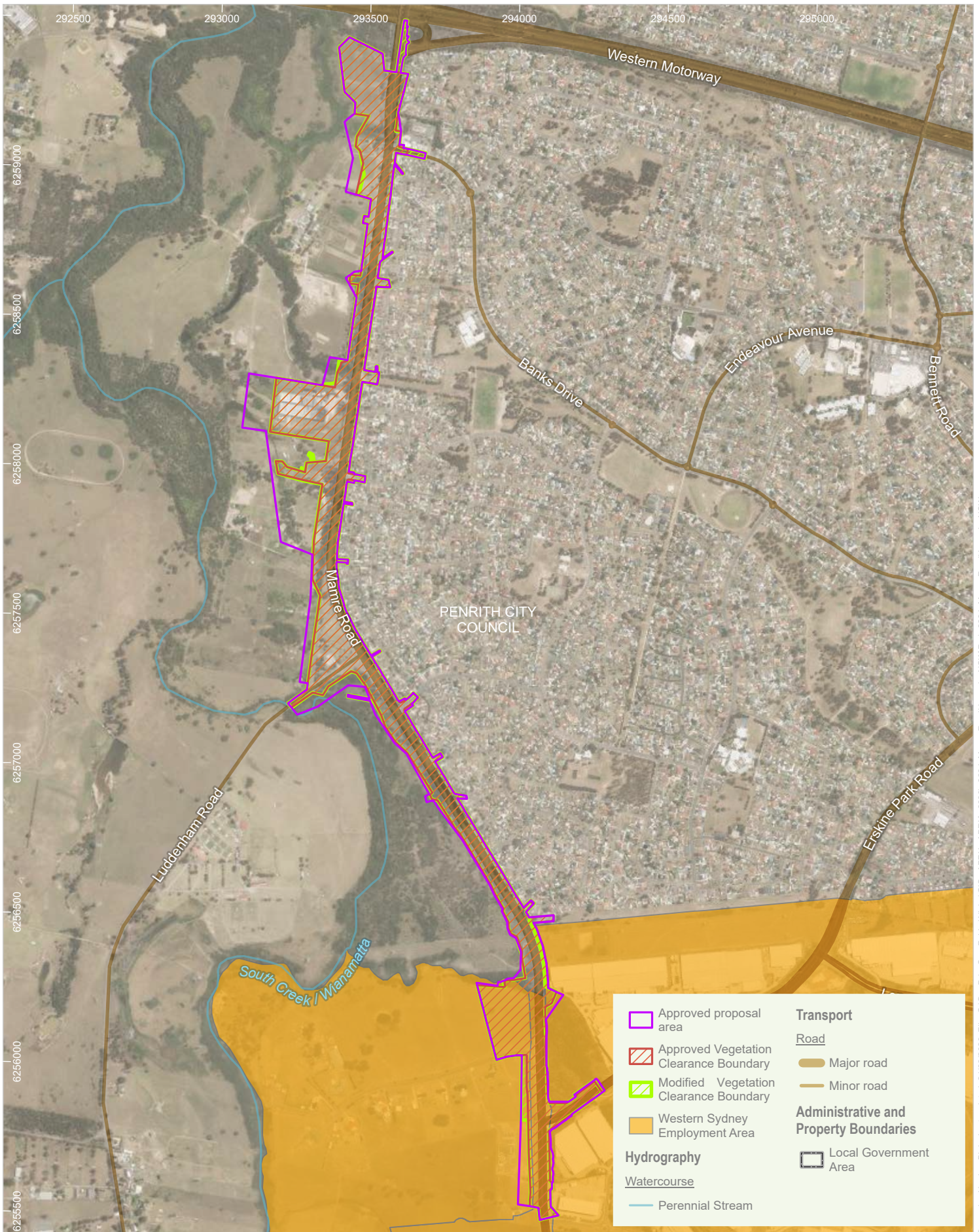
Mamre Road Upgrade - Biodiversity Development Assessment Report (BDAR)

Niche PM: Luke Baker
 Niche Proj. #: 6634
 Client: Transport for NSW / Aurecon

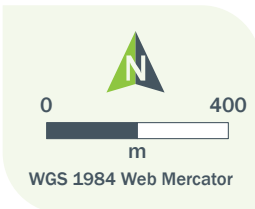
Figure 1

World_Ocean_Base: NIWA, GeosciencesAustralia, Esri, Garmin, NaturalVue/public/NSW_Imagery: © Department of Customer Service 2020/World Hillshade: Esri, Geoscience Australia, NASA, NGA, USGS | Watercourses, Waterbodies, Road and Rail alignments, Protected areas of NSW © Spatial Services 2021. | Niche uses GDA2020 as standard for all project-related data. In order to ensure that data from numerous sources and coordinate systems is aligned, on-the-fly transformation to WGS1984 Web Mercator Auxiliary Sphere is used in the map above. For ease of reference, the grid tick marks and labels shown around the border of the map are presented in GDA2020, using the relevant MGA zone.

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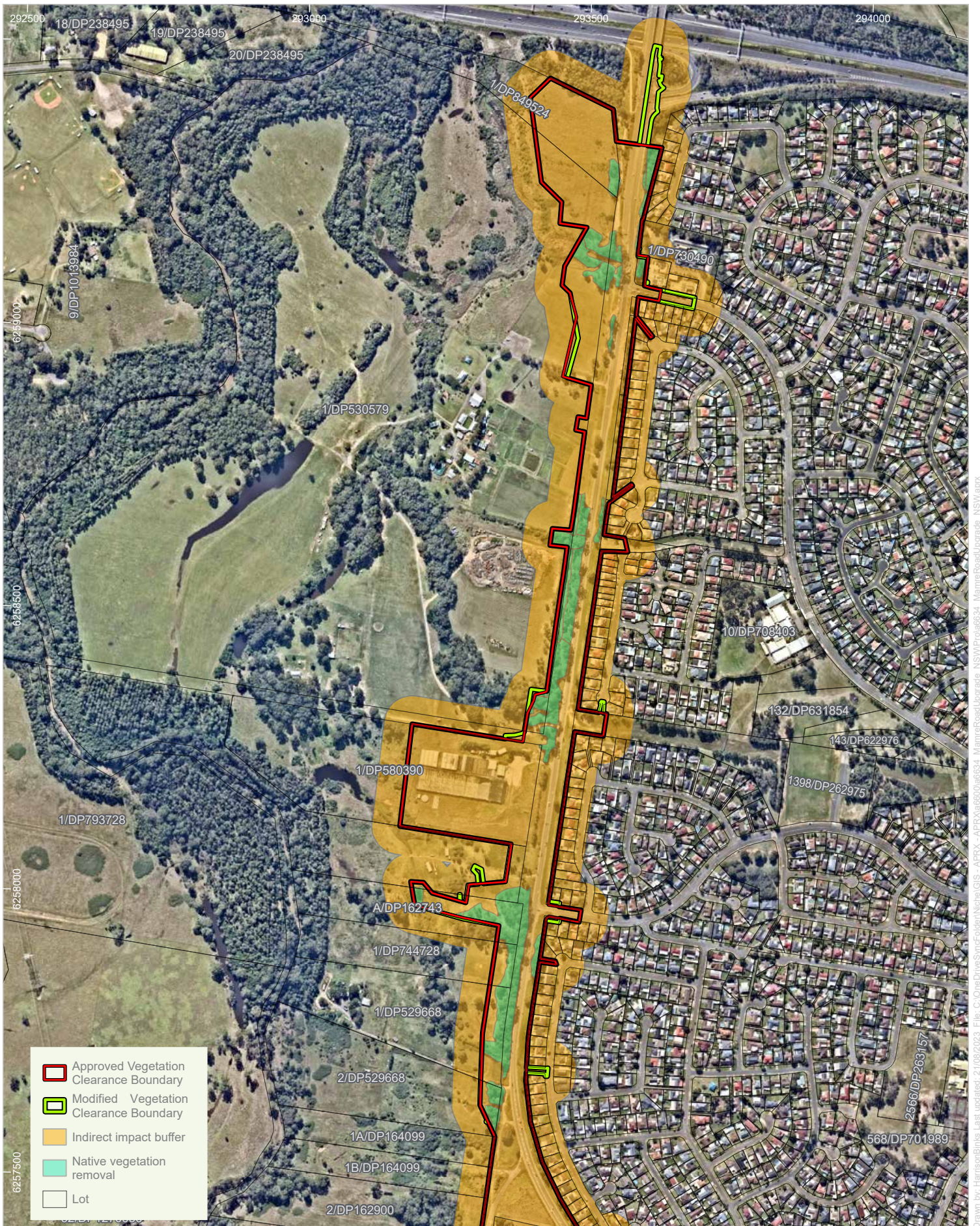
The proposal area

Mamre Road Upgrade - Biodiversity Development Assessment Report (BDAR)

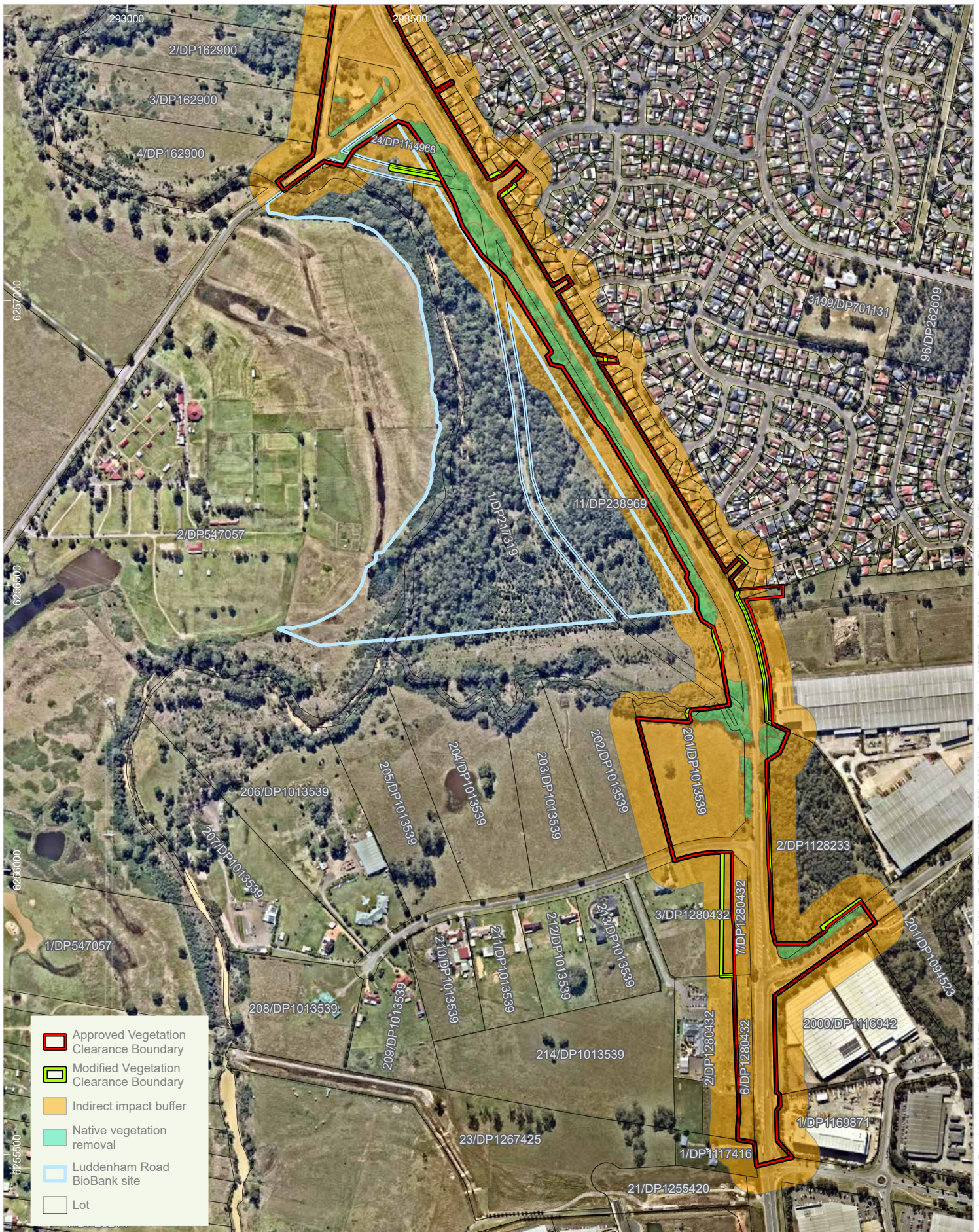
Niche PM: Luke Baker
Niche Proj. #: 6634
Client: Transport for NSW / Aurecon

Figure 2

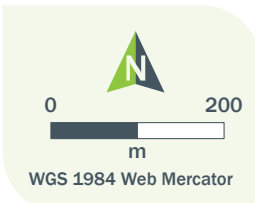
World Imagery: Maxar/public/NSW_Imagery. © Department of Customer Service 2020 | Watercourses, Waterbodies, Road and Rail alignments, Protected areas of NSW © Spatial Services 2021. | Niche uses GDA2020 as standard for all project-related data. In order to ensure that data from numerous sources and coordinate systems is aligned, on-the-fly transformation to WGS1984 Web Mercator Auxiliary Sphere is used in the map above. For ease of reference, the grid tick marks and labels shown around the border of the map are presented in GDA2020, using the relevant MGA zone.



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The proposal area and vegetation clearance boundary
Mamre Road Upgrade - Biodiversity Development Assessment Report (BDAR)

Niche PM: Luke Baker
 Niche Proj. #: 6634
 Client: Transport for NSW / Aurecon

Figure 3.2

World Imagery: Maxar/public/NSW_Imagery. © Department of Customer Service 2020 | Watercourses, Waterbodies, Road and Rail alignments, Protected areas of NSW © Spatial Services 2021. | Niche uses GDA2020 as standard for all project-related data. In order to ensure that data from numerous sources and coordinate systems is aligned, on-the-fly transformation to WGS1984 Web Mercator Auxiliary Sphere is used in the map above. For ease of reference, the grid tick marks and labels shown around the border of the map are presented in GDA2020, using the relevant MGA zone.

2 Landscape features

2.1 Identified features

The landscape assessment has been assessed in Chapter 2 of the BDAR (Niche 2022). The additional 0.35 hectares of vegetation/habitat do not result in change to the landscape score generated by the BAM-C.

3 Native vegetation

3.1 Vegetation survey

The additional 0.35 hectares of vegetation that would be cleared for the proposed modification was surveyed by Luke Baker (Manager, Accredited Assessor and Botanist) on the 10th of July 2023.

The purpose of the field survey was to confirm the PCT and condition class associated with the additional impact areas. Detail of the vegetation alignment are provided in Table 3-1, and a description of the PCTs are provided in the BDAR (Niche 2022).

The field survey confirmed that no additional BAM plots would be required, as the number of BAM plots collected as part of the BDAR (Niche 2022) were enough to meet the minimum plot requirement for both the BDAR and the additional vegetation clearance area.

The survey did not have any significant limitations that would influence the results of the assessment.

Table 3-1: Minimum number of plots required and completed per zone area

PCT Code / vegetation zone	BDAR (Niche 2022) Vegetation zone area (ha)	Additional vegetation area (ha)	Total (ha)	Plots required	Plots completed
PCT 849_moderate	3.68	0.05	3.73	2	2
PCT 849_low	0.93	0.11	1.04	1	1
PCT 835_moderate	2.97	0.19	3.16	2	2
PCT 835_low	1.25	0	1.25	1	3
PCT 1800_moderate	0.47	0	0.47	1	1
Total	9.30	0.35	9.65	7	9

3.2 Vegetation mapping results

The vegetation survey confirmed the presence of two PCTs within the additional vegetation clearance boundary:

- PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
- PCT 835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion.

Both PCTs are aligned to Threatened Ecological Communities (TECs) as indicated in Table 3-2.

A description of both PCTs, TEC alignment, and full species lists are provided in the BDAR (Niche 2022).

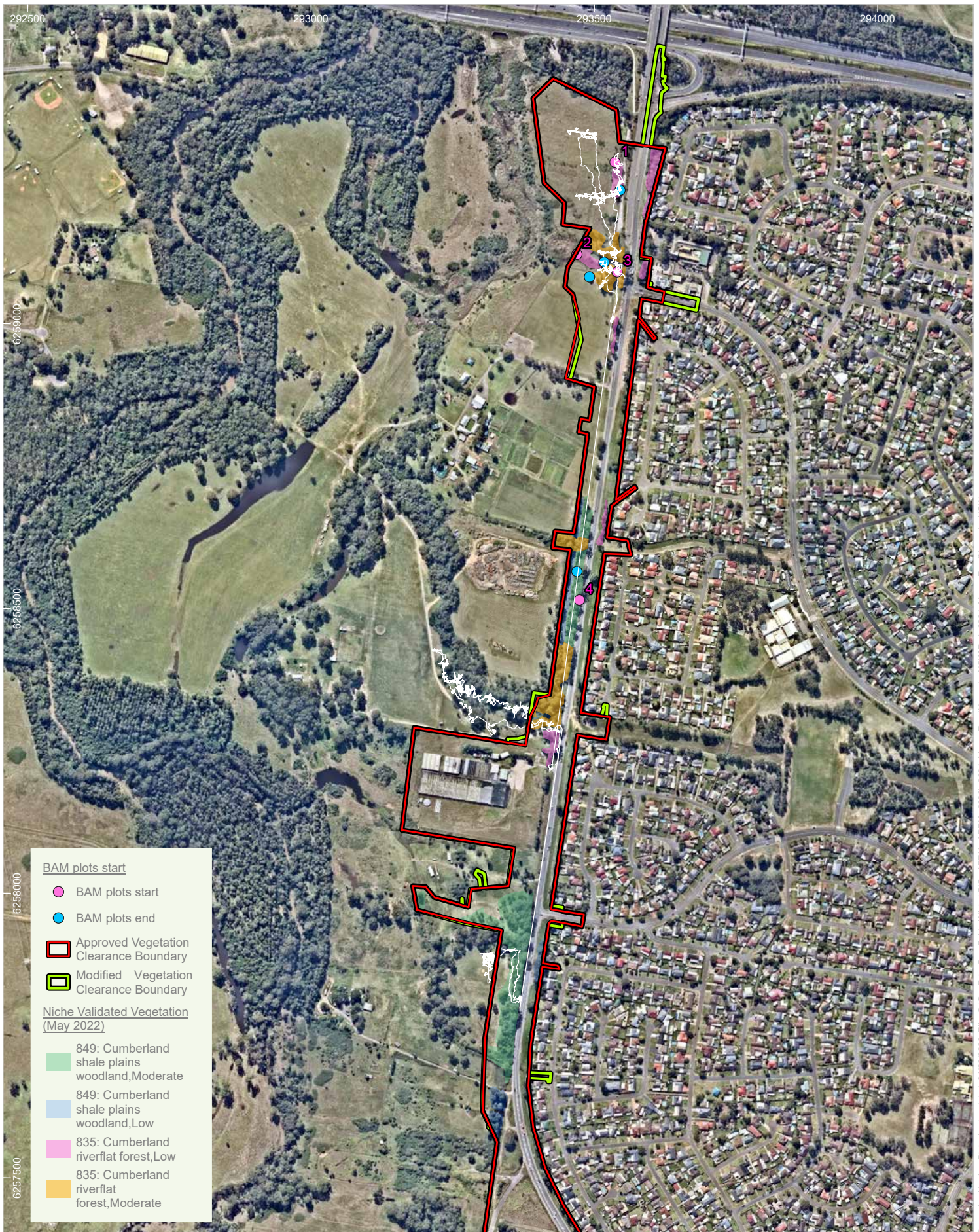
Table 3-2 details the condition of each vegetation zone.

Table 3-2 Plant community types by vegetation zone

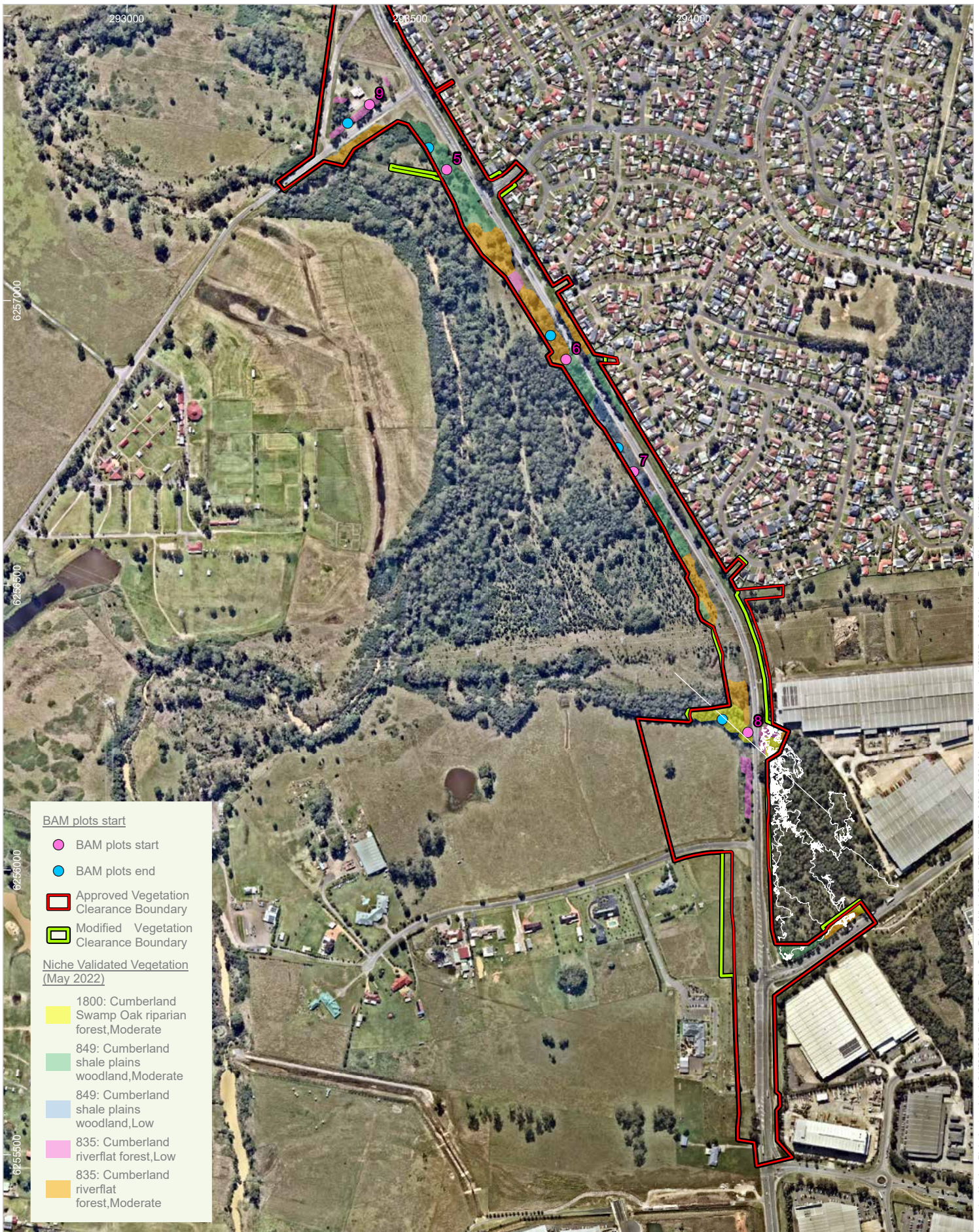
Vegetation Zone	Plant community type (PCT)	Vegetation Formation	Vegetation Class	Threatened Ecological Community ¹	PCT Cleared Extent	Condition identified (Used in BAM-C)	Vegetation integrity score	Patch size (ha)	Area (ha) within vegetation clearance boundary (Niche BDAR 2022)	Additional vegetation clearance boundary (ha)	Total (ha) within modified vegetation clearance boundary
849_moderate	PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Grassy Woodlands	Coastal Valley Grassy Woodlands	Yes - aligns to the CEEC Cumberland Plain Woodland (BC and EPBC Act)	93	Moderate	48.6	101	3.68	0.05	3.73
849_low	PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Grassy Woodlands	Coastal Valley Grassy Woodlands	Yes - aligns to the CEEC Cumberland Plain Woodland (BC Act)	93	Low	7.6	101	0.93	0.11	1.04
835_moderate	PCT 835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Forested Wetlands	Coastal Floodplain Wetlands	Yes - aligns to River-Flat Eucalypt Forest (a CEEC under the BC Act and a EEC under the EPBC Act)	93	Moderate	72.4	101	2.97	0.19	3.16

¹ Alignment to NSW and Commonwealth TECs have been provided in Table 3-3 to Table 3-7 in the approved BDAR

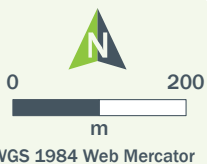
Vegetation Zone	Plant community type (PCT)	Vegetation Formation	Vegetation Class	Threatened Ecological Community ¹	PCT Cleared Extent	Condition identified (Used in BAM-C)	Vegetation integrity score	Patch size (ha)	Area (ha) within vegetation clearance boundary (Niche BDAR 2022)	Additional vegetation clearance boundary (ha)	Total (ha) within modified vegetation clearance boundary
835_low	PCT 835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Forested Wetlands	Coastal Floodplain Wetlands	Yes - aligns to River-Flat Eucalypt Forest (a CEEC under the BC Act)	93	Low	27.6	101	1.25	0	1.25
1800_moderate	PCT 1800 Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley.	Forested Wetlands	Coastal Floodplain Wetlands	Yes - aligns to the EEC Swamp Oak Floodplain Forest (BC Act)	60	Moderate	36.1	101	0.47	0	0.47



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Validated Vegetation mapping Mamre Road Upgrade - Biodiversity Development Assessment Report (BDAR)

Niche PM: Luke Baker
Niche Proj. #: 6634
Client: Transport for NSW / Aurecon

Figure 4.2



	Approved Vegetation Clearance Boundary
	Modified Vegetation Clearance Boundary
	Indirect impact buffer
	500 metre landscape buffer
Watercourse	
	Non Perennial Stream
	Perennial Stream
	Waterbody
	Biodiversity Values
	Cumberland Plain Woodland
	River-Flat Eucalypt Forest
Niche Validated Vegetation (May 2022)	
	River-Flat Eucalypt Forest
	Cumberland Plain Woodland

6257500

6258000

6258500

6259000

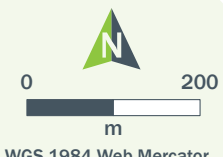
292500

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Threatened Ecological Communities

Mamre Road Upgrade - Biodiversity Development Assessment Report (BDAR)

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Figure 5.1

World Imagery: Maxar/public/NSW_Imagery. © Department of Customer Service 2020 | Watercourses, Waterbodies, Road and Rail alignments, Protected areas of NSW © Spatial Services 2021. | Niche uses GDA2020 as standard for all project-related data. In order to ensure that data from numerous sources and coordinate systems is aligned, on-the-fly transformation to WGS1984 Web Mercator Auxiliary Sphere is used in the map above. For ease of reference, the grid tick marks and labels shown around the border of the map are presented in GDA2020, using the relevant MGA zone.

4 Threatened species

4.1 Threatened flora

A total of 90 hours of threatened flora survey was completed as part of the BDAR (Niche 2022). An additional 3 hours of threatened flora survey was carried out by Luke Baker on the 10th of July 2023 to assess the additional 0.35 hectares of vegetation/habitat that occurs within the modified vegetation clearance boundary.

No threatened flora species were recorded within the additional areas of the modified vegetation clearance boundary.

The dominance of introduced grasses, such as *Eragrostis curvula* (African love grass), *Chloris gayana* (Rhodes grass) and *Paspalum dilatatum* (Paspalum) across portions of the additional clearance areas also would act as a suppressant for threatened flora to regenerate.

Furthermore, the areas inspected were dominated by introduced grasses which were regularly slashed or mown, would likely suppress threatened flora from occurring.

Based on the results of the recent survey, the survey undertaken as part of the BDAR (Niche 2022), and the dominance of suppressant weeds, no threatened flora are likely to be impacted by the additional 0.35 hectares of vegetation clearing associated with the proposal.

4.2 Threatened fauna

Details regarding the threatened fauna survey, along with the assessment of candidate threatened fauna species are provided in the BDAR (Niche 2022).

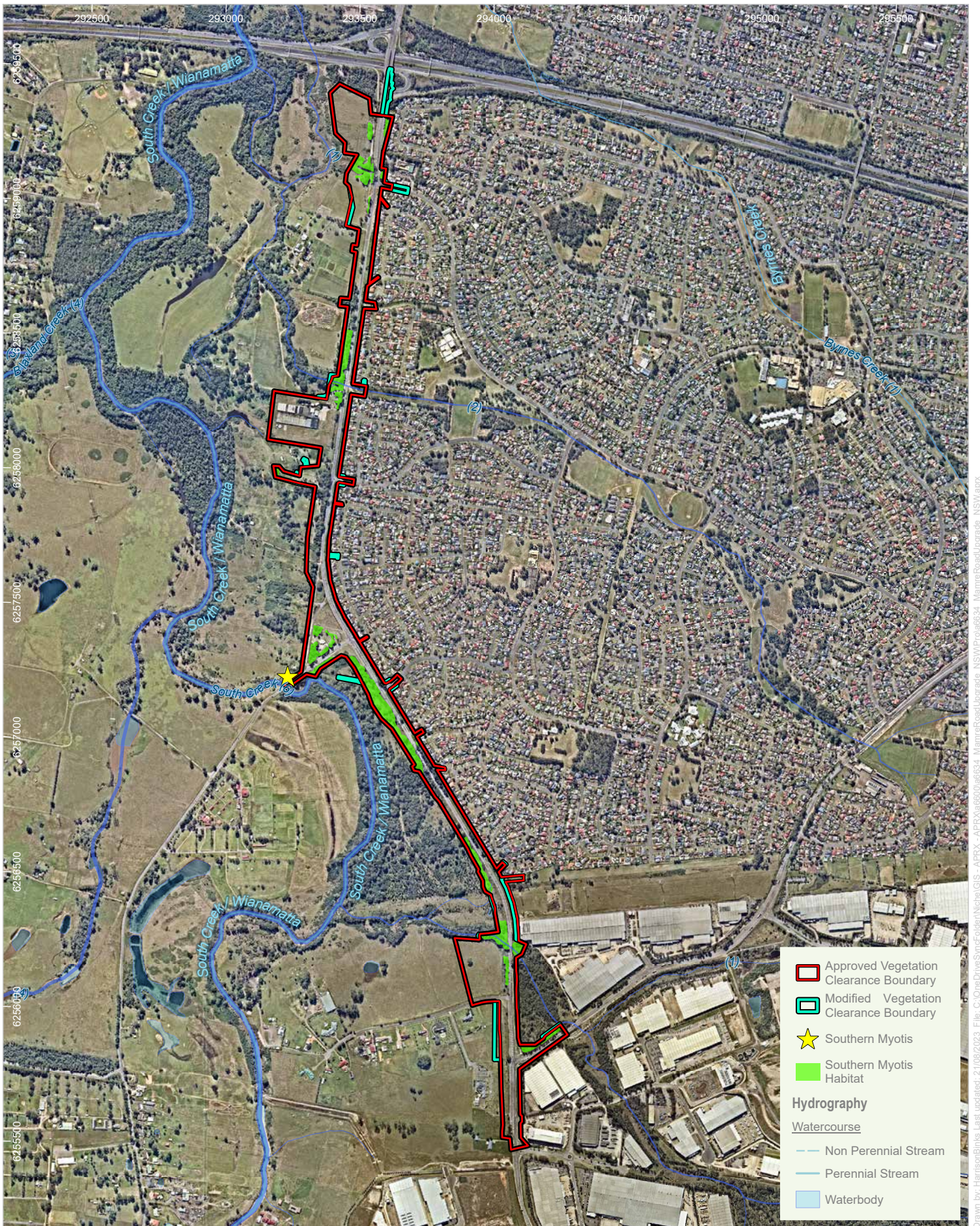
As described in Niche (2022), seven threatened fauna species were recorded during the field survey: Cumberland Plain Land Snail, Grey-headed Flying-fox, Southern Myotis, Large Bentwing-bat, Little Bentwing-bat, Greater Broad-nosed Bat and Yellow-bellied Sheath-tail-bat. Of these species, two are regarded as species credit fauna – Cumberland Plain Land Snail and the Southern Myotis; whilst the remaining are regarded as ecosystem credit fauna.

The additional 0.35 hectares of vegetation clearing would result in an increase in direct impacts towards the follow species credit fauna: Cumberland Plain Land Snail, and the Southern Myotis which were confirmed to be presented during the BDAR (Niche 2022).

The area of potential habitat that occurs within the modified vegetation clearance boundary (referred to as the species polygon) has been provided in Table 4-1.

Table 4-1. Increase in habitat for Cumberland Plain Land Snail and Southern Myotis

Species	Potential habitat	Area of potential habitat assessed in BDAR (ha)	Area of additional habitat associated with proposed modification (ha)	Total area (ha)
Cumberland Plain Land Snail	<p>Two populations of the Cumberland Plain Land Snail were recorded during the targeted survey associated with the BDAR.</p> <p>The updated vegetation clearance boundary would increase the species polygon by 0.35 ha:</p> <ul style="list-style-type: none"> - Additional 0.11 hectares of PCT 849 low - Additional 0.05 hectares of PCT 849 moderate - Additional 0.19 hectares of PCT 835 moderate. 	3.46	0.35	3.81
Southern Myotis	<p>The proposal would result in additional 0.35 hectares associated with the following PCTs:</p> <ul style="list-style-type: none"> - 0.19 hectares of PCT 835 moderate - 0.11 hectares of PCT 849 low - 0.05 hectares of PCT 849 moderate. 	5.94	0.35	6.29



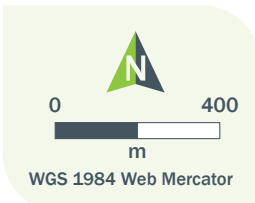
- Approved Vegetation Clearance Boundary
- Modified Vegetation Clearance Boundary
- ★ Southern Myotis
- Southern Myotis Habitat

Hydrography

Watercourse

- Non Perennial Stream
- Perennial Stream
- Waterbody

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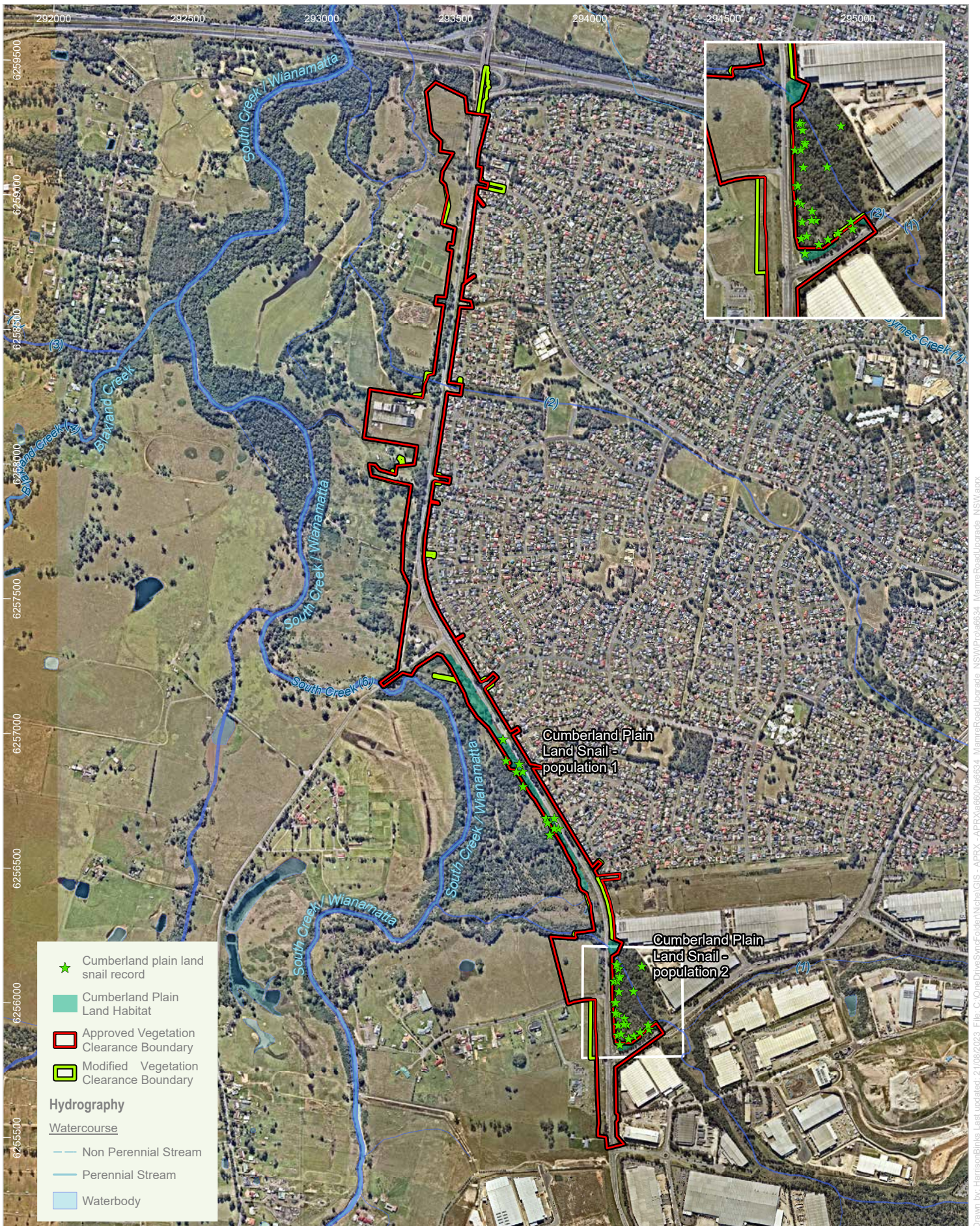
Southern Myotis species polygon

Mamre Road Upgrade - Biodiversity Development Assessment Report (BDAR)

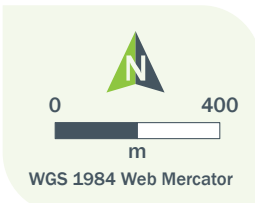
Niche PM: Luke Baker
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Figure 6

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Cumberland Plain Land Snail - species polygon
Mamre Road Upgrade - Biodiversity Development Assessment Report (BDAR)

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Figure 7

World Imagery: Earthstar Geographics/World Imagery: Maxar/public/NSW_Imagery. © Department of Customer Service 2020 | Watercourses, Waterbodies, Road and Rail alignments, Protected areas of NSW © Spatial Services 2021. | Niche uses GDA2020 as standard for all project-related data. In order to ensure that data from numerous sources and coordinate systems is aligned, on-the-fly transformation to WGS:1984 Web Mercator Auxiliary Sphere is used in the map above. For ease of reference, the grid tick marks and labels shown around the border of the map are presented in GDA2020, using the relevant MGA zone.

5 Impact assessment

5.1 Additional direct impacts on native vegetation and habitat

The proposed modification would result in an additional 0.35 hectares of vegetation clearing. The majority of vegetation likely to be affected by the proposal has been subject to historic clearing, grazing, and other agricultural activities, and is therefore thinned in areas, and dominated in areas by a range of introduced species. This is evident in all condition classes of the vegetation to be impacted.

The area of impact including the vegetation integrity score has been provided in Table 5-1 below.

Table 5-1: Direct impacts to native vegetation

Vegetation Zone	PCT	Status (BC Act)	Area to be impacted assessed in BDAR (2022) (ha)	Additional direct impacts	Total (ha) within modified vegetation clearance boundary	Future value	Change (loss) in vegetation integrity score	Number of hollow bearing trees impacted
849_Moderate	849 - Cumberland shale plains woodland	CEEC	3.68	0.05	3.73	0	-48.6	0
849_Low	849 - Cumberland shale plains woodland	CEEC	0.93	0.11	1.04	0	-7.6	0
835_Moderate	835 - Cumberland riverflat forest	EEC	2.97	0.19	3.16	0	-72.4	0
835_Low	835 - Cumberland riverflat forest	EEC	1.25	0	1.25	0	-27.6	0
1800_Moderate	1800 - Cumberland Swamp Oak riparian forest	EEC	0.47	0	0.47	0	-36.1	0
-	Non-native	-	35.46	0	0.60	-	-	-

5.2 Indirect impacts on native vegetation and habitat

The proposed modification would not significantly increase the indirect impacts already assessed in the BDAR (Niche 2022). Mitigation measures that would capture all indirect impacts associated with the approved project are provided in the BDAR. No additional mitigation measures are proposed for the proposed modification.

5.3 Impacts to threatened species

The proposed modification would increase the direct impact to two threatened biodiversity that are regarded as 'species credits' as per the requirements of the BAM: Cumberland Plain Land Snail and Southern Myotis (Table 5-2).

No other threatened species credit fauna or flora are likely to be impacted by the additional 0.35 hectares of vegetation clearing.

Table 5-2. Threatened species impacts

Threatened species	Status (BC Act)	Area of impact in BDAR (Niche 2022)	Additional direct impact	Total impact
Southern Myotis	Vulnerable	5.94 ha of potential roosting/foraging habitat	0.35 of potential roosting/foraging habitat	6.29 ha
Cumberland Plain Land Snail	Vulnerable	3.46 ha of potential habitat	0.35 ha of potential habitat	3.81 ha

5.4 Serious and irreversible impacts

Cumberland Plain Woodland is listed as threatened biodiversity at risk of SAI. The BDAR (Niche 2022) addresses the SAI assessment requirements for the direct impact to 4.61 hectares of Cumberland Plain Woodland. The proposed modification would result in an additional 0.16 hectares of direct impact to the Critically Endangered Ecological Community (CEEC).

Table 5-3: SAI Assessment for Cumberland Plain Woodland

Assessment requirement	BDAR Assessment (Niche 2022)	Addendum consideration
<p>Impacts of the proposal on the TEC, including:</p> <ol style="list-style-type: none"> 1. Impact on the geographic extent of the TEC <ol style="list-style-type: none"> a. In hectares, and b. As a percentage of the current geographic extent of the TEC in NSW 	<ol style="list-style-type: none"> a. The proposal would remove up to 4.61 ha of Cumberland Plain Woodland TEC. b. The current extent of the TEC in NSW is 6,500 ha (Bionet Vegetation Classification Database). The direct impact from the proposal represents around 0.06% of the estimated current extent of the TEC in NSW. Within the locality (within 10 km of the proposal) about 79 ha of the TEC has been mapped by OEH (2013). The proposal represents 5% of the TEC within the locality. 	<ol style="list-style-type: none"> a. The proposed modification would increase the removal of CEEC by 0.16 ha. b. No change compared to BDAR given relatively small amount of additional direct impact.
<ol style="list-style-type: none"> 2. The extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes by: <ul style="list-style-type: none"> - estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals - describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by: <ul style="list-style-type: none"> - distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and 	<ul style="list-style-type: none"> - Within 500 m of the proposal, about 21.09 ha of the TEC is estimated to occur based off OEH (2013) vegetation mapping and aerial interpretation. <p>The 21.09 ha of TEC occurs as scattered patches ranging in size of about 0.02 ha to greater than 5 ha. Those patches immediately adjacent the proposal area have been shown on Figure 11, along with the corresponding area of each patch that would be retained.</p> <p>The TEC within the proposal area predominately consists of scattered patches along Mamre Road.</p> <p>The vegetation clearing would result in an increased distance between the fragmented patches immediately adjacent to the proposal area, rather than the creation of isolated patches.</p> - Clearing under the proposal would create edge effects on the local occurrence of the TEC. Fragmentation of the TEC currently exists as scattered patches within the proposal area. The proposal would increase the distance between the already fragmented patches. - The proposal would result in a greater distance between already fragmented patches of Cumberland Plain Woodland. 	<ul style="list-style-type: none"> - No change compared to BDAR given relatively small amount of additional direct impact. - No change compared to BDAR given relatively small amount of additional direct impact. - No change compared to BDAR given relatively small amount of additional direct impact.

Assessment requirement	BDAR Assessment (Niche 2022)	Addendum consideration
<ul style="list-style-type: none"> - estimated maximum dispersal distance for native flora species characteristic of the TEC, and - other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development. 	<ul style="list-style-type: none"> - Characteristic native flora within the patches of Cumberland Plain Woodland in the proposal area is likely to be dispersed by birds, animals, and wind. Each flora species would have differing dispersal distances due to seed. It could be reasonable to assume that the maximum dispersal for some plants is about 300 metres. This would likely be more related to bird dispersal. - The proposal for the most part, is proposed within a highly fragmented and impacted environment. The Cumberland Plain Woodland in its current form, would likely further decline without sufficient remediation work due to the on-going edge effects. 	<ul style="list-style-type: none"> - No change compared to BDAR given relatively small amount of additional direct impact. - No change compared to BDAR given relatively small amount of additional direct impact.
<p>3 describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.</p>	<p>Area of the TEC have been significantly impacted by historic logging, grazing, weed invasion, and feral animal impacts, and as such, no portions of the TEC within the proposal area are in a benchmark condition. Based on the plot surveys within and surrounding the development envelope, two vegetation condition classes were attributed to the TEC:</p> <ul style="list-style-type: none"> - Moderate which had a vegetation integrity score of 48.6 - Low which had a vegetation integrity score of 7.6. 	<p>No change compared to BDAR given relatively small amount of additional direct impact.</p>
<p>Proposed measures to avoid direct and indirect impacts</p>	<p>Proposed measures to mitigate impacts of the proposal are discussed in Section 6 of BDAR (Niche 2022).</p>	<p>No additional mitigation measures proposed</p>

5.5 Prescribed biodiversity impacts

Prescribed biodiversity impacts have been assessed in the BDAR (Niche 2022).

The additional 0.35 hectares of direct impacts are unlikely to result in an impact assessment that differs to that presented in the BDAR. The additional 0.35 hectares of direct impact are unlikely result in significant impacts to karst, caves, cliffs, human-made structures, connectivity of habitat, water quality and hydrological processes, and vehicle strike.

5.6 Aquatic impacts

Aquatic biodiversity impacts have been assessed in the BDAR (Niche 2022).

The proposed modification is unlikely to increase aquatic impacts associated with the approved project as the location of the additional vegetation disturbance is predominately located away from riparian areas, and is of a minor scale that would not change the impact assessment completed in the BDAR (2022). Basin filling work on the western side of Mamre Road would be required to fill the eastern edge of the existing basin south of Pine Creek Circuit. This existing basin was dry at the time of the field survey. The basin filling work would allow for utilities relocation and enable fencing along the property boundary. This work would be within the existing approved proposal area. The closest natural watercourse is approximate 80 m to the south of the basin. Based on the proposed scope of the basin fillings work, it is unlikely to result in any significant impact to aquatic biodiversity or significant impacts to the filling and aquatic degradation of any natural watercourse.

5.7 Groundwater dependent ecosystems

Potential impacts to groundwater have been assessed in the Aurecon (2021) *Water quality and soil impact assessment* in the REF for the approved REF and additional qualitative assessments for the submission responses and Addendum REF. The assessment concludes 'impacts to terrestrial and aquatic groundwater dependant ecosystems within proximity to the proposal as a result of changes in groundwater level are likely to be minor'.

The additional 0.35 hectares are unlikely to result in significant groundwater related impacts compared to that already assessed in the BDAR.

5.8 Matters of National Environmental Significance

Impacts to threatened biodiversity listed on the EPBC Act have been assessed in the BDAR (Niche 2022).

The additional 0.35 hectares of vegetation clearing would result in an increase in impacts towards those Commonwealth matters assessed in Table 5-4.

The additional 0.35 hectares is unlikely to result in a change to the outcomes of the Assessment of Significance completed as part of the BDAR.

Table 5-4. Commonwealth Assessment of Significance

Threatened Biodiversity	Assessment of Significant Conclusion in BDAR (Niche 2022)	Conclusion associated with proposed modification
Grey-headed Flying Fox	<p>Conclusion: Based on the assessment completed, it was concluded that the proposal is unlikely to result in a significant impact due to the following:</p> <ul style="list-style-type: none"> - No Grey-headed Flying Fox camp sites occur within the proposal area or immediate surrounds - The habitat to be removed is not considered to be particularly important foraging habitat in terms of its constitution or size, and - Higher quality foraging habitat occurs elsewhere in the locality, including within protected areas. 	No change. Additional 0.35 hectares is unlikely to result in significant impact.
Cumberland Plain Woodland	<p>Conclusion: Based on the assessment completed, it was concluded that the proposal may result in a significant impact due to the following:</p> <ul style="list-style-type: none"> - About 3.68 ha of the CEEC would be directly impacted by the proposal. - The Cumberland Plain Woodland to be impacted is already fragmented and is in a degraded condition state. - The Cumberland Plain Woodland to be removed will not adversely affect habitat critical to the survival of an ecological community, and - The Cumberland Plain Woodland to be removed is unlikely to be an important source of genetic diversity or viable seed for the persistence of the ecological community within the locality. 	No change. Impact to Cumberland Plain Woodland may result in a significant impact.
River-flat Eucalypt Forest	<p>Conclusion: Based on the assessment completed, it was concluded that the proposal is unlikely to result in a significant impact due to the following:</p> <ul style="list-style-type: none"> - The River-flat Eucalypt Forest to be impacted is already fragmented and is in a degraded condition state - The River-flat Eucalypt Forest to be removed will not result adversely affect habitat critical to the survival of an ecological community, and - The River-flat Eucalypt Forest to be removed is unlikely to be important to support genetic diversity and a seed source for the locality. 	No change.

6 Mitigation

6.1 Mitigation measures

The mitigation measures provided in the BDAR (Niche 2022) are applicable to the additional area within the modified vegetation clearance boundary.

No further specific mitigation measures are required.

6.2 Ecosystem credits

The BAM identifies the BAM-C as the appropriate tool for quantifying the offsets required, which is expressed as numbers of ecosystem and species credits. A calculation of the nature and extent of biodiversity credits required due to ecological impacts associated with the proposal has been undertaken using the BAM-C.

The results of the BAM-C, ecosystem offset credit requirements, including current, future and change in vegetation integrity scores are shown in Table 6-1.

Impacts to native vegetation communities within the development site generate a requirement for 9 additional ecosystem credits compared to that presented in the BDAR. The full BAM-C biodiversity credit report is provided in Annexure A.

Table 6-1: Ecosystem credits

PCT	BDAR (Niche 2022)							Proposed modification	
	Vegetation zone	Impact area (ha) ²	Current Vegetation Integrity score	Future Vegetation Integrity score	Change in Vegetation Integrity Score	Biodiversity risk weighting	Required credits	Additional clearing	Total BAM credits
PCT 835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	835_Moderate	2.97	72.4	0	72.4	2	108	0.19	7
	835_Low	1.25	27.6	0	27.6	2	17	0.0	0
PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	849_Moderate	3.68	48.6	0	48.6	2.5	112	0.05	2
	849_Low	0.93	7.6	0	7.6	2.5	0	0.11	0
PCT 1800 Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley.	1800_Moderate	0.47	36.1	0	36.1	2	8	0	0
Total							245	0.35	9

² Note that the BAM-C rounds the impact area to the nearest decimal place in some cases.

6.3 Species credits

The results of the BAM-C species offset credit requirements are shown in Table 6-2. The additional 0.35 hectares would require an additional 18 species credits. The full BAM-C biodiversity credit report is provided in Annexure A.

Table 6-2: Species credits required

BDAR (Niche 2022)			Proposed modification additional credits	
Species	Habitat impacted	Credits required	Habitat impacted	Credits required
Southern Myotis	5.94	157	0.35	9
Cumberland Plain Land Snail	3.46	87	0.35	9

6.4 Credits matching the ‘like for like’ and credit variation rules

The BAM allows for certain PCT’s to be offset with other PCTs where the ‘like for like’ rule can be met. The BAM also puts restrictions on where credits can be sourced and whether hollow-bearing trees must be present at the offset site.

Where ‘like for like’ credits cannot be sourced, the BAM also allows for other credit types to be sourced subject to the variation rules contained in the BC Regulations.

The like-for-like and variation offset options for ecosystem credits are listed in Table 6-3.

Table 6-3. ‘Like for like’ and variation offset options for ecosystem credits

PCT	Hollow bearing trees required	PCTs matching ‘like for like’ requirements	Variation options
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions / PCT 835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	No	686, 828, 835, 839, 941, 971, 1064, 1108, 1109, 1212, 1228, 1232, 1293, 1318, 1326, 1386, 1504, 1522, 1556, 1594, 1618, 1646, 1648, 1720, 1794.	42, 835, 1232.
Cumberland Plain Woodland in the Sydney Basin Bioregion /PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	No	849, 850	201, 266, 277, 282, 303, 312, 654, 677, 680, 705, 849, 1191, 1295, 1326, 1330, 1332

PCT	Hollow bearing trees required	PCTs matching 'like for like' requirements	Variation options
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions / PCT 1800 Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley.	No	915, 916, 917, 918, 919, 1125, 1230, 1232, 1234, 1235, 1236, 1726, 1727, 1728, 1729, 1731, 1800, 1808	1064, 1106, 1227, 1230, 1232, 1234, 1235, 1318, 1386, 1716, 1717, 1718, 1720, 1723, 1727, 1728, 1730, 1731.

7 Conclusion

Transport have aimed to avoid and minimise environmental impacts from the approved project and proposed modification as far as practical, and have proposed a series of mitigation measures to manage potential indirect impacts.

The unavoidable impacts of the proposed modification on ecological values includes the clearing of an additional 0.35 hectares of vegetation regarded as 'native vegetation,' as defined in the BAM. Associated fauna habitat would also be directly impacted.

Through the application of the BAM, associated guidelines and the BAM-C, the following additional biodiversity credit offset is required for the proposed modification:

7 x credits for PCT 835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion

- 2 x credits for PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
- 9 x credits for Southern Myotis
- 9 x credits for Cumberland Plain Land Snail.

8 References

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- Department of Planning, Industry and Environment (2019a), Biodiversity Assessment Operational Manual Stage 2. Available from: <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/biodiversity-assessment-method-operational-manual-stage-1-180276.pdf>
- Department of Planning, Industry and Environment (2020a), Biodiversity Assessment Method. Available from: <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/biodiversity-assessment-method-2020-200438.pdf>
- Department of Planning, Industry and Environment (2020d) Draft Cumberland Plain Conservation Plan 2020, Published by NSW Department of Planning, Industry and Environment
- Department of Planning, Industry and Environment (2020f), GDE Atlas, Sydney. Available At: <http://www.bom.gov.au/water/groundwater/gde/map.shtml>
- Department of Planning, Industry and Environment (2021) Threatened Species Collection Database
- Niche Environment and Heritage (2022) Biodiversity Development Assessment Report, Mamre Road Upgrade – Stage 1 Submissions report. Prepared for NSW Transport for NSW.
- NSW National Parks and Wildlife Service (2002) Interpretation Guidelines for the Native Vegetation Maps of the Cumberland Plain, Western Sydney, Final Edition NSW NPWS, Hurstville.
- NSW Scientific Committee (2008) Change in the distribution of Cumberland Plain Woodland. NSW Scientific Committee, Sydney.
- Roads and Maritime Services (2011), Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects. Roads and Traffic Authority, NSW. Available on the RMS website at: https://www.rms.nsw.gov.au/business-industry/partners-suppliers/documents/guides-manuals/biodiversity_guidelines.pdf

Annexure A

BAM-C Credit Report



BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00025463/BAAS20002/21/00025464	6634 Mamre rd upgrade	22/06/2023
Assessor Name	Assessor Number	BAM Data version *
Luke Baker	BAAS17033	61
Proponent Names	Report Created	BAM Case Status
Luke Baker	29/11/2023	Finalised
Assessment Revision	Assessment Type	Date Finalised
1	Part 5 Activities	29/11/2023

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered Ecological Community	849-Cumberland shale plains woodland
Species		
Nil		

Additional Information for Approval

Assessment Id	Proposal Name
00025463/BAAS20002/21/00025464	6634 Mamre rd upgrade

BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
849-Cumberland shale plains woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion	0.2	0	2	2
835-Cumberland riverflat forest	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.2	0	7	7

835-Cumberland riverflat forest

Like-for-like credit retirement options

Name of offset trading	Trading group	Zone	HBT	Credits	IBRA region
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BAM Biodiversity Credit Report (Like for like)

	group					
	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 686, 828, 835, 941, 1108, 1109, 1212, 1228, 1293, 1318, 1326, 1386, 1504, 1556, 1594, 1618, 1720, 1794, 3145, 3181, 3185, 3188, 3192, 3258, 3328, 4024, 4025, 4039, 4041, 4058, 4138	-	835_Moderate	No	7	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
849-Cumberland shale plains woodland	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region

BAM Biodiversity Credit Report (Like for like)

	Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 849, 850, 3319, 3320	-	849_Moderate	No	2	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 849, 850, 3319, 3320	-	849_Low	No	0	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Meridolum corneovirens / Cumberland Plain Land Snail	849_Moderate, 849_Low, 835_Moderate	0.4	9.00
Myotis macropus / Southern Myotis	849_Moderate, 849_Low, 835_Moderate	0.4	9.00

Credit Retirement Options

Like-for-like credit retirement options

Species	Spp	IBRA subregion
Meridolum corneovirens / Cumberland Plain Land Snail	Meridolum corneovirens / Cumberland Plain Land Snail	Any in NSW



BAM Biodiversity Credit Report (Like for like)

Myotis macropus / Southern Myotis	Spp	IBRA subregion
	Myotis macropus / Southern Myotis	Any in NSW

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00025463/BAAS20002/21/00025464	6634 Mamre rd upgrade	22/06/2023
Assessor Name	Report Created	BAM Data version *
Luke Baker	29/11/2023	61
Assessor Number	BAM Case Status	Date Finalised
BAAS17033	Finalised	29/11/2023
Assessment Revision	Assessment Type	
1	Part 5 Activities	

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Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAI	Ecosystem credits
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Cumberland riverflat forest												
3	835_Mode rate	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	72.4	72.4	0.19	PCT Cleared - 93%	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		7
										Subtotal	7	
Cumberland shale plains woodland												
1	849_Mode rate	Cumberland Plain Woodland in the Sydney Basin Bioregion	48.6	48.6	0.05	PCT Cleared - 93%	High Sensitivity to Gain	Critically Endangered Ecological Community	Critically Endangered	2.50	TRUE	2
2	849_Low	Cumberland Plain Woodland in the Sydney Basin Bioregion	7.6	7.6	0.11	PCT Cleared - 93%	High Sensitivity to Gain	Critically Endangered Ecological Community	Critically Endangered	2.50	TRUE	0
										Subtotal	2	
										Total	9	

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAIL	Species credits
<i>Meridolum corneovirens / Cumberland Plain Land Snail (Fauna)</i>									
849_Moderate	48.6	48.6	0.05			Endangered	Not Listed	False	1
849_Low	7.6	7.6	0.11			Endangered	Not Listed	False	1
835_Moderate	72.4	72.4	0.19			Endangered	Not Listed	False	7
								Subtotal	9
<i>Myotis macropus / Southern Myotis (Fauna)</i>									
849_Moderate	48.6	48.6	0.05			Vulnerable	Not Listed	False	1
849_Low	7.6	7.6	0.11			Vulnerable	Not Listed	False	1
835_Moderate	72.4	72.4	0.19			Vulnerable	Not Listed	False	7
								Subtotal	9

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00025463/BAAS20002/21/00025464	6634 Mamre rd upgrade	22/06/2023
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1	Part 5 Activities	29/11/2023

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Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered Ecological Community	849-Cumberland shale plains woodland
Species		
Nil		

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

BAM Biodiversity Credit Report (Variations)

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
849-Cumberland shale plains woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion	0.2	0	2	2.00
835-Cumberland riverflat forest	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.2	0	7	7.00

835-Cumberland riverflat forest	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region

BAM Biodiversity Credit Report (Variations)

	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 686, 828, 835, 941, 1108, 1109, 1212, 1228, 1293, 1318, 1326, 1386, 1504, 1556, 1594, 1618, 1720, 1794, 3145, 3181, 3185, 3188, 3192, 3258, 3328, 4024, 4025, 4039, 4041, 4058, 4138	-		835_Moderate	No	7	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Variation options							
	Formation		Trading group	Zone	HBT	Credits	IBRA region
	Forested Wetlands		Tier 1	835_Moderate	No	7	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
849-Cumberland shale plains woodland	Like-for-like credit retirement options						
	Class		Trading group	Zone	HBT	Credits	IBRA region

BAM Biodiversity Credit Report (Variations)

Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 849, 850, 3319, 3320	-	849_Moderate	No	2	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 849, 850, 3319, 3320	-	849_Low	No	0	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Meridolum corneovirens / Cumberland Plain Land Snail	849_Moderate, 849_Low, 835_Moderate	0.4	9.00
Myotis macropus / Southern Myotis	849_Moderate, 849_Low, 835_Moderate	0.4	9.00

Credit Retirement Options **Like-for-like options**

Meridolum corneovirens / Cumberland Plain Land Snail	Spp	IBRA region
	Meridolum corneovirens / Cumberland Plain Land Snail	Any in NSW
Variation options		
Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act	IBRA region

BAM Biodiversity Credit Report (Variations)

		shown below	
	Fauna	Endangered	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Myotis macropus/ Southern Myotis	Spp	IBRA region	
	Myotis macropus/Southern Myotis	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

